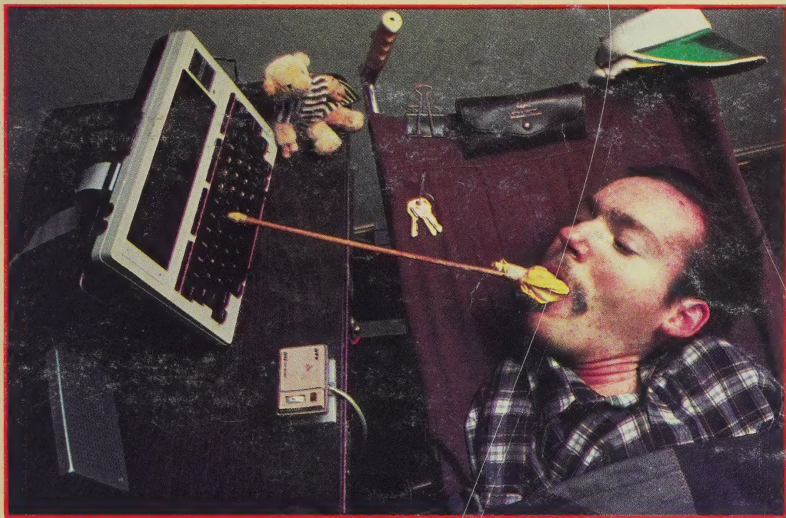


WHOLE EARTH Software Review

ENABLING COMPUTERS p. 46



Reviewer MARK O'BRIEN: "For the first time, I feel my writing can be private. I am free to keep a journal, write personal letters that really are personal, and rewrite as much as I want without having to pay a secretary . . . Next to a power wheelchair, a computer is the most useful gadget a disabled person can own."

Telecommunications Software; Macintosh vs. PCjr;
Artificial Intelligence

FEATURED PROGRAM: T.REX



This isn't the replacement for *MS. PAC-MAN*. *T.REX* is a new direction for animated programs you maneuver with a joystick. This new focus is on simulation of natural science environments where you get to live out the daily challenges of being a dinosaur or act as manager of a beehive.

Dinosaurs had a tougher time than you imagine. Tyrannosaurus had to wrestle with water supplies, where to find other dinos to feed on (and conserve energy while tracking 'em down), the ambient temperature and even whether the terrain he crossed could support his bulky body. If that doesn't sound tough, then why did they disappear?

KERON Productions Inc., developers of *T.REX*, leave that answer to you as you maneuver the beast through environments they have created with scrupulous scientific accuracy. That's what simulations are all about and why personal computers are becoming more interesting — they can provide experiences that aren't possible any other way.

More information on *T.REX* and what simulations can offer is found in the article written by **KERON's** chief executive officer, Ron Rollet, beginning on page 69. —RD

ENABLING COMPUTERS

Art Kleiner, resident expert on systems designed for the disabled, has powerful examples of what can be achieved with a computer when used by some remarkable people in his article, "Enabling Computers" which starts on page 46.

Lest anyone get too involved in feeling sorry for someone like Mark O'Brien, the talented young man who appears on the cover and in this article, I'd suggest you listen closely to what Mark has to say. And you might also think how we all are disabled one way or the other — by physical or emotional imperfections and the ever-encroaching aging process. It really comes down to what you do with what you got, as Jiminy Cricket used to croon.

Art and I were discussing that point while going over his article. I found myself getting angry (as much at myself as with Art, but it's always easier to unload at the Other Guy) and blurted: "You know, you and I are real turkeys. What percentage of your capabilities are YOU using — and what percent is Mark using?" That's why we're using the term "enabling" to describe the systems used in the article, and if you mull it over a bit, personal computers can enable any of us.

Telecommunications is another enabling part of the PC phenomenon. Our survey (also written by Art) identifies what's available that makes communicating by computer worthwhile and provides our recommendations for getting into this dimension-stretching realm.

One of the subtle advantages — you appear as a mind to others, not as a fat, flabby forty-year-old or even a Burt Reynolds lookalike. A very liberating environment where you bump into electronically-linked communities of people you didn't know were out there. Where your physical limits or disabilities don't count. And an indicator of how revolutionary the whole computer thing may turn out to be.

—Richard Dalton, Editor

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Summer
1984

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We owe noted calligrapher John Prestianni an apology (along with admiration and thanks) for not previously recognizing his excellent execution of the Review's logo and the taxonomy section headings you see throughout the magazine. Hope this squares things, John. Designer Scott Kim also contributed to the unique lettering.

Sausalito's Matt Herron took the cover picture of Mark O'Brien, who was crippled by polio and is only able to move his neck, left knee and foot. Mark's review of his Radio Shack Model 100 is on page 47. Matt's fine photography also appears in "Enabling Computers" (page 47) and the Nils Nilsson interview on page 117. Thanks, Matt. —RD

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ABOUT ACCESS . . .

"Access" is a tradition for Whole Earth publications. When we began the *Review*, it was obvious that access information served a number of new purposes — people could use it to screen software reviews and find out whether a program matched their personal computer equipment, operating system, budget or attitudes about copy protection.

Since then, we have evolved a format for access that admittedly isn't as consistent or helpful as it might be. We are (predictably) enlisting your help. Bound into the back of this issue is a reader survey form that asks which parts of access help you most and what may be missing. Take a look at the diagram below and let us know your preferences. The time you save may be your own. —RD

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The example we have shown is for a software product. There will be different information provided for computer systems, books and other types of products, but the intent is the same — to give you a snapshot of key information about whether the review is useful to you and how to obtain the product.

**IBM PC/compatibles, 128K;
Apple II +, IIe/compatibles, 48K;
80-column printer. \$250. Copy**

This section gives information about which computers can use the software and any requirements like minimum memory, disk(s), or if a color monitor is mandatory. IBM PC and Apple II compatible systems are generally not indicated by specific computer brand because: (1) there are so many of them; (2) it's close to impossible to predict which "compatibles" will actually run a given program.

If you own an IBM PC or Apple II compatible computer, we recommend you test out each program you are considering on a computer that is configured like your own before buying it.

If the program is distributed on one or more 5¼" diskettes, no mention is made of the software medium. If it is supplied on a cassette, ROM cartridge or other medium, we'll let you know (specifically for each brand of computer).

**80-column printer. \$250. Copy
protected? YES. Human Edge**

The price shown is the manufacturer's list price. You may be able to get the program for much less through mail order or other discount merchandisers. If the price varies, it will be indicated for each brand of computer.

We indicate whether a program is or isn't copy protected. If it isn't, you can make a copy of the program for back-up or other uses. For more information on "other uses," see the related article starting on page 122.

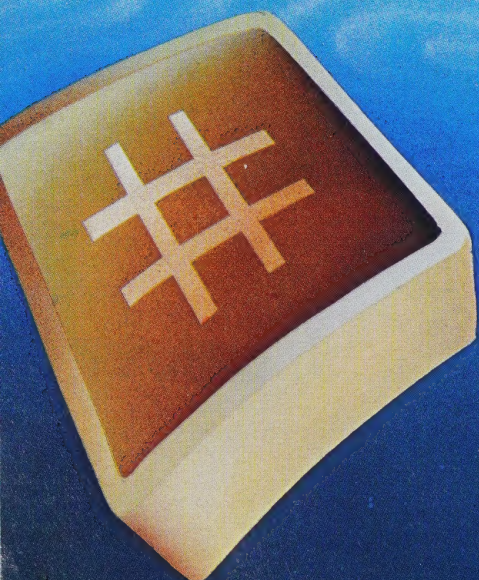
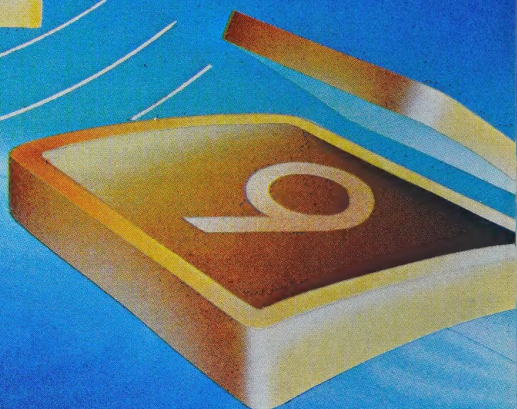
**protected? YES. Human Edge
Software Corporation, 2445
Faber Place, Palo Alto, CA
94303; 800/624-5227 (in CA,
800/824-7325).**

The name, address and phone of the company that publishes the software is shown in case you can't locate the program at local computer stores or through other software dealers. More than other kinds of publishers, software companies are often well set up to handle phone inquiries.

ELECOMMUNICATING



by Art Kleiner



Telecommunications is probably the most personal way to use a personal computer. There are so many useful activities "online," and so many different tools for reaching them, that those who hook their computers to the telephone find themselves doing something unique. Here are some examples from people we know:

David Hughes of Colorado Springs entered the text of a pernicious city council bill on his home computer, which he had set up as a computerized bulletin board that others could dial into. Within a week, he had gathered enough angry readers to storm the next city council meeting and influence them to defeat the measure.

Mike Greenly writes articles about the computer industry on *The Source*, a nationwide dial-up network. "The difference between me and a print journalist is (1) my coverage is immediate (readers had info on Steve Jobs's launch of Macintosh just minutes after he'd finished speaking) and (2) readers can interact with me. They tell me what they'd like me to report on, and we swap information."

Louis Jaffe coordinates clerical work with business associates by electronic mail. "We use a local computer bulletin board system to leave documents for each other,

set lunch dates, etc. An acquaintance regularly sends me spreadsheet files by phone. Loaded into *SuperCalc*, they work just fine."

Three years ago, Tom Howard searched remote databases for obscure information on power rates, helping a reform group challenge a power utility company in court. Robert Heinmiller used computer network/satellite connections to collect data files from oceanographers on distant ships.

Elaine Kerr counsels novice computer networkers from four continents without leaving her living room in Fanwood, New Jersey. Tony Bove and Cheryl Rhodes transmit articles for their magazine, *The User's Guide*, directly to a typesetting machine in another town. Steven Levy telecommunicates his monthly *Popular Computing* column to his editors,



Illustration by Jim Ludke

which gives him two extra writing days before deadline. Rick Smolan coordinates dozens of traveling photographers through a worldwide computer network that informs them of new assignments.

People play games, order products, use large-computer systems, retrieve public domain (free) software, spin mutual fantasy stories, follow specific news stories, seek romance and stock quotations, and track their bank statements through computer networks. At Whole Earth, we gather software reviews and gossip through computer conferences on two national networks: *EIES* and *CompuServe* (p. 25).

Unfortunately, this most personal of computer applications is also one of the most technically complex. The necessary tools — modems and communications software — are uneasy compromises between computers and phone lines, which weren't designed to work together. Every computer network and software package

you use will take some fiddling until you get your connections right.

But don't be daunted — it's getting easier. Programs are finally emerging that treat telecommunicating as a human activity instead of a technical obstacle course. Modems are getting cheaper and more reliable. A few computers are appearing with built-in modems. And the networks are growing more plentiful and reliable (often more expensive, too, but still cheaper per minute than long-distance telephone calls). For this section, we've selected the most effective terminal programs and the most rewarding services for reaching other people.

For CP/M computers, *MITE* is the most versatile and relatively easy-to-use standard terminal program. It fits most computer/network combinations. *Post-Plus* offers split-screen (writing and receiving simultaneously) to expert networkers. *MODEM7* is inexpensive, adaptable, widely used, and public domain.

WHOLE EARTH RECOMMENDED TELECOMMUNICATION TOOLS

TERMINAL PROGRAMS

For CP/M (Kaypro, Morrow, etc):

- **MITE** (\$150) p. 12
- **MODEM7** (\$25 or less) p. 13
- **Post-Plus** (\$249.95) p. 14

For IBM PC and Compatibles:

- **Hayes Smartcom II** (\$149) p. 15
- **CROSSTALK XVI** (\$195) p. 18
- **Transend PC** (\$189) p. 16
- **Personal Communications Manager** (\$128) p. 16
- **PC-TALK.III** (\$35) p. 17

For Apple II and IIe:

- **ASCII Express "the Professional" and Z-Term "the Professional"** (\$129.95 and \$149.95) p. 20
- **Telephone Software Connection TERMINAL PROGRAM** (\$40) p. 17
- **Data Capture IIe** (\$90) p. 17

For Commodore 64:

- **VIDTEX** (\$39.95) p. 18

For Radio Shack Computers:

- **DBLCOM** (\$45) p. 14
- **VIDTEX** (\$39.95) p. 18

On the IBM PC, *Smartcom II* is for telecommunications with straightforward requirements, *CROSSTALK XVI* for those who want to automate complex communications tasks into single commands. *PC-TALK.III* is slightly more limited than either of these, but much less expensive. *Transend* and IBM's *Personal Communications Manager* fill specialized electronic mail needs.

For Apple users, both *Telephone Software Connection Terminal Program* (40-column) and *Data Capture II* (80 column) are inexpensive, versatile and reliable. *ASCII Express "the Professional"* is the full-featured expert program; Apple CP/M users should get *MITE* (general purpose) or *Z-Term "the Professional"* (expert). Commodore 64 and Radio Shack Model I, II, III, IV, 4P, 12, 16, Color Computer, and Color Computer 2 owners will find CompuServe's *VIDTEX* a good, full-featured terminal program for any computer network. *DBLCOM* offers split-screen on

Radio Shack. We're still evaluating terminal programs for Macintosh, HP 150, Commodore VIC, and Atari (gossip says there's a great public domain Atari program called *AMODEM*). Reviews will follow next issue.

MCI Mail is the easiest, most cost-effective electronic mail system; *SourceMail* the most versatile with the most active recipients; and *IEMS* the best for reaching telex and large corporate electronic mail systems. *CompuServe* provides the most accessible inexpensive conferencing, especially for people interested in computers; *Source PARTI* is a free-wheeling, enjoyable challenge, but not useful for consistent communication; *EIES* offers amenable, full-featured conferencing for making projects work. We're still looking at *Delphi*, *CONFER*, and other conferencing systems. In forthcoming issues, we'll also cover information services — data banks of searchable information, dial-up news wires, airline reservation systems, etc. — and programs for directly transferring files from one computer to another.

Send us your opinions on telecommunications services or any type of software. You can reach us by electronic mail on *The Source* (PS0008); on *MCI Mail* (AKLEINER); on *CompuServe* (76703,436, or type GO WEC at any prompt); or on *EIES* (message 866, 334, 324 and 226).

Getting Started

1. Buy a modem — a device to translate computer output into sounds that travel on phone lines. Modem buyers must make three decisions. First, 300 or 1200 baud? Baud indicates the speed at which bits flow to and from your computer each second. At 300 baud

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BOOKS

- **The Complete Guide to Personal Computer Communications** p. 21
- **The Computer Phone Book** p. 21

ELECTRONIC MAIL

- **MCI Mail** p. 22
- **SourceMail** p. 22
- **International Electronic Mail Service (IEMS)** p. 23

CONFERENCING SYSTEMS

- **CompuServe SIGs** p. 24
- **Participate-on-the-Source** p. 25
- **Electronic Information Exchange System (EIES)** p. 25

(roughly 30 characters per second), words appear on the screen letter by letter, just a little quicker than most people can follow (though a few months of it will pick up your reading speed). At 1200 baud (120 characters per second) text flashes past one phrase at a time — too fast to read, but usually slowly enough to skim. Since most networks are overcluttered with communications, and charge for every minute you're connected, I prefer skimming. The important text goes onto my computer's disks, where I can peruse it later. To balance the cheaper connect-time charges at higher speed, 1200-baud modems cost twice as much, and some networks (like *CompuServe* and *The Source*) charge twice as much per hour for the faster service. Most 1200-baud modems work at both speeds, so you can select high speed when it's cost-effective.

The second decision: automatic or manual dial? Autodial modems let you set up commands to dial the phone and contact "log into" networks automatically, a worthwhile convenience (which can take a few hours of fiddling to set up the first time). If you want your software to pull in messages at a pre-selected time while you're absent, you'll need an autodial modem. Manual-dial modems are cheaper and often more reliable, and some people prefer typing in the codes by hand.

The third decision: a standalone modem outside your computer or a built-in modem board? Modem boards, which fit into slots in the computer, are less expensive and often preconfigured for the software that comes with them. But you can use standalone modems with more than one computer. We have not formally

evaluated all modems, but see the box on page 19 for a preliminary list of modems we use or have heard about.

2. Buy communications software that permits the greatest number of uses: As a terminal program it will dial phone numbers through your modem, generate commands needed to log into computer networks at the other end of the phone lines, record incoming text on your computer's disk — a process called "capturing" or "downloading" — and send text you previously typed with your word processor to other computers. This latter process, called "uploading," saves connect-time charges, because your software sends text faster than you can type it. As a file-transfer program, communications software will transfer disk files directly between two computers (linked by telephone or direct cables), and retransmit the files if it discovers transmission errors. As an unattended electronic mail program, the software will answer the phone when other people dial your number with their computers, and let them send you messages or pick up disk files.

3. Join networks. For local bulletin boards, see *The Computer Phone Book* (p. 21). National networks offer different communications and information services, which we review individually. When you join a service like *The Source*, *Dow Jones* or *CompuServe*, it supplies you with a sequence of commands for contacting the service. That sequence includes a local phone number for a national data network, the coded address of the service you want, your identification number and a password.

4. Connect it all together and start. Some modems don't come with the cable that connects it to

your computer; you may need to buy that separately. Many terminal programs need to be configured for your computer, modem and the network you dial into. We don't recommend any terminal program here unless its configuration methods are self-explanatory. When you configure, you may be asked to choose communications parameters that seem mysterious. Don't be put off; these specifications depend on the network you dial up. Most personal computer networks use the same choices: 7 data bits, 1 stop bit, even parity. Start with those settings. You may be asked if you want the XON/XOFF (or "stop/start") transmission protocol. Tell it yes; it's just a method for your computer and the remote system to take turns sending and receiving text. For a more complete explanation of these terms, see *The Complete Handbook of Personal Computer Communications* (p. 21). —AK

Low Cost Networking

You don't need a \$200 program, \$600 modem, and \$2000 computer to dial your local bulletin board. You can find a used terminal (often for as little as \$50-\$100) with an RS-232 connector and hook it to a \$70 Anchor Volksmodem (p. 19). It'll work more reliably than many \$700 modem/software combinations. It won't dial your phone, save text on a disk, or transmit files, but it will let you sign on to remote networks and participate. Here are some other low cost options:

- Before you rush out to buy a communications package, see if your operating system disk in-

cludes a "dumb" terminal program (like that on the Kaypro II and Radio Shack Models III and IV). You'll have to dial by hand (or with the modem's own commands) and you won't be able to save any text on disk, but the program will get you online.

- Seek public domain or inexpensive terminal software, such as *MODEM7*, *PC-TALK.III*, *DBLCOM* and *Telephone Software Connection Terminal Program*. There are others: at local users' groups, on bulletin boards, or in the *CompuServe* users' group SIGs (p. 24).

- Look for cheap modems.

See page 19.

- Use a low-cost computer: an Atari, a Commodore VIC or 64, a Radio Shack Color Computer. All have active users' groups on *CompuServe*, where members swap program information and tips. Some, like the Radio Shack Color Computer, have easy-to-use terminal programs; others, like the Commodore 64, can take as much toying as an Apple or homebrew CP/M system.

- Use a portable printing telephone terminal, like the Texas Instruments Silent 700. They have good keyboards, print everything on thermal paper and traditionally have had two rubber suction cups in the back for a phone handset. (New models connect directly to telephone jacks, and offer options for editing offline and automatic log-ins.) Printing terminals can't save anything to disk, but they produce paper copies of everything — a mixed blessing. A TI Silent 700 sells new for \$700-1025, depending on options; information from Texas Instruments, Customer Response Center, Data Systems Group, P. O. Box 402430 H-646, Dallas, TX 75240; 800/527-3500. Used models sell for as little as \$300.

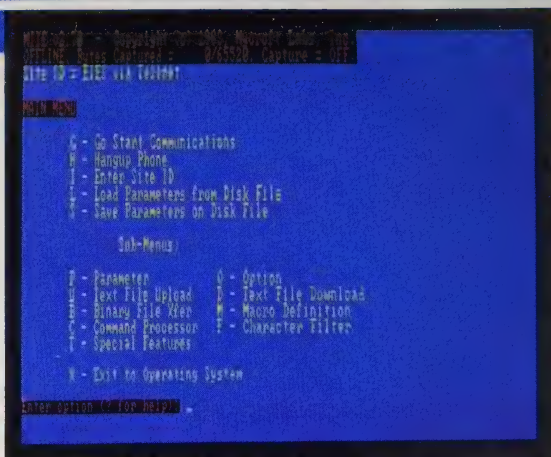
—AK

MITE

8-bit computers running CP/M; 16-bit computers running CP/M 86 (MITE 86) or MS-DOS (MITE/PC); RS-232 connectable modem.

8-bit: \$150. 16-bit: \$195.
Mycroft Labs, Inc., P.O. Box 6045, Tallahassee, FL 32314; 904/385-1141.

MITE's main menu. Each submenu at the bottom half allows you to customize different specifications. MITE is more adaptable to various computers, modems and networks than any other terminal program.



Finding *MITE* was like sailing into safe harbor after a violent storm. My first assignment for this section was to select one reliable terminal program that all our staffers could use with the same commands for a variety of networks. It had to send text, capture text, and dial in automatically. Since we use Kaypros, it had to be CP/M-based.

There are several dozen CP/M terminal programs. Some don't work. Others take hours to install, or have no break key or no automatic log-in commands. Some (like *Micro Link II*) work fine, but operate so illogically that using them takes constant concentration. Woody Liswood, who edits our "analyzing" section, and Ward Christensen, who invented the first versions of the XMODEM protocol and *MODEM7* (p. 13), both praised *MITE*. When it finally arrived, I realized neither had praised it enough.

MITE supports automatic log-in sequences (plus nine other commands you define yourself) for as many networks as you use. With each network, you can meddle with (or ignore) a wide range of communications parameters, filter out unwanted communications characters that might confuse your word processor, and customize the keys you use to operate *MITE* itself. As a result, *MITE* solves network- and modem-compatibility problems better than any other program I've seen. If you can't

figure out the solution yourself, I hear Mycroft offers excellent program support.

MITE isn't as fully automatic as *CROSSTALK*, *ASCII Express*, or *Post-Plus*: you can't write a command to automatically dial one network, collect messages, hang up and dial another network. (The newest version apparently allows such commands.) It's not as easy to use as *Smartcom II*; you write *MITE* log-in command sequences on a single line, and in a peculiar shorthand, and you must retype the sequence entirely if you make a mistake. But *MITE* has the clearest manual of any telecom program (for instance: many manuals describe Dow Jones News Service, but only *MITE's* describes how to filter out the CTRL-L characters that mess up the way Dow Jones appears on your screen.) Once you know what to do, you can bypass *MITE's* menus, but they're so clear and logically sound that you may use them anyway.

MITE is the meat-and-potatoes telecommunications software I recommend most often, especially when you need to use one program on several different computers. (It runs on any computer with CP/M, including Apple, Epson QX-10, IBM PC, Radio Shack, and SONY. They're releasing an MS-DOS version which looks good.) It's the standard against which I judged all the others.

—AK

Protocols

Protocols are agreed-upon codes for establishing contact between two communicating computers and checking for transmission errors. Many communications software owners don't need to be aware of them; they're mostly used to transfer files.

Even when you

transfer files, you only need to ensure that both hooked-up computers employ the same protocol. It usually doesn't matter which protocol it is, *unless* you're swapping files between your micro and a mainframe, or sending graphics — purposes beyond the scope of this issue.

Communications software that contains a number of protocols is to

your advantage, particularly if one is called XMODEM or CHRISTENSEN (after its inventor, Ward Christensen). XMODEM is incorporated not only in public domain programs like *PC Talk* and *MODEM7*, but also in many commercial packages: *MITE*, *CROSSTALK XVI*, *Terminal Program*, *ASCII Express*, and *Z-Term* herein.

—Art Kleiner

MODEM7

Sources: The Public Domain Software Copying Company, 33 Gold Street c13, New York, NY 10038; 212/732-2565;

New York Amateur Computer Club, P.O. Box 106, Church Street Station, New York, NY 10008; 212/864-4595 (Catalog \$10);

Special Interest Group/Micros, Amateur Computer Group of New Jersey, P.O. Box 2085, Clifton, NJ 07015 (Catalog \$2.50).

CP/M User's Group, 1651 Third Avenue, New York, NY 10028.

God bless Ward Christensen. I just finished picking up a file via *MODEM7* from a friend's *Oasis*-based homebrew computer with 8" disks, totally incompatible with my Kaypro II. Required this command: R [filename]. After that, *MODEM7* proceeded to pump 17 data blocks down the line, neatly verifying receipt of each (including the retransmission of block 15, which got garbled) and confirming the end of file. That's easy communications — free, too.

—Richard Dalton

MODEM7 is less a program than an extended family. The grandsire is Ward Christensen's 1977 public domain *MODEM* program, for which he developed (with Randy Sues) the *XMODEM* protocol (see protocols, above). Modifying *MODEM* became one of the great traditions in CP/M hackerdom. After *MODEM4*, *MODEM5*, *MODEM6* and *MODEM7*, the numbering froze — new versions fall in the *MODEM700s*. There have been enough to overrun *MODEM799*, start over at *MODEM701* and work back

toward *MODEM799* again (detouring occasionally for renegade versions with names like *SM-MODEM*). *MODEM7* adaptations include versions for every CP/M computer, autodialing directories, and versions tailored to specific computer networks.

The standard "vanilla" *MODEM7* is easy to use but not easy to learn. The only onscreen help is a cryptic list of the one-key commands that might send text from your disk to a remote computer or store incoming text on your own disk. The manual, written on disk, varies from adequate to none. Once you learn them, the one-key commands are convenient.

Novices should visit their local users' group to find people with *MODEM7* folk wisdom and disks already configured for the proper computer. (The magazine *Computer Shopper*, p. 114, lists users' groups in every issue.) You can order *MODEM7* for nominal prices at the mail-order sources listed here. The more exactly you specify your computer and modem when you order, the better chance it will be configured correctly. If you already have one *MODEM7* version, you can call up a local Remote CP/M bulletin board (see *The Computer Phone Book*, p. 21) or *CompuServe's* CP/M users' group *SIG* (p. 24) and pull in their newer versions — which might be only days old. It's worth the trouble. *MODEM7* is not just free, it's one of the best terminal programs around; and if you learn it, you can modify it to *your* needs: *MODEM793*, *MODEM794*, *MODEM795* . . . —AK

Post-Plus/DBLCOM

Post-Plus: CP/M 80 or any TRS DOS; Autodial or manual modem; printer suggested. \$249.95. Copy protected? NO. Post-by-phone, P.O. Box 102, Wynnewood, PA 19096; 215/649-1598.

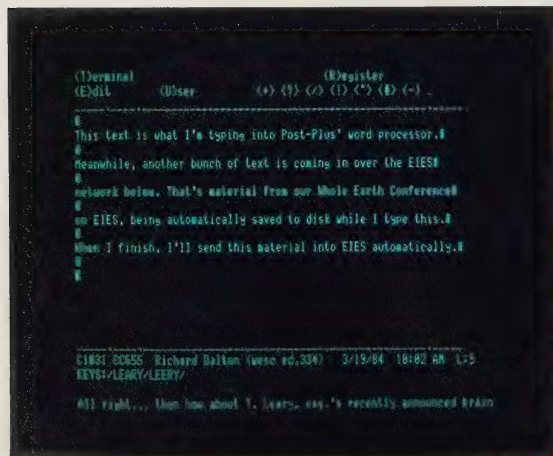
DBLCOM: TRS-80 Model II (or Model IV in Model III mode); TRSDOS 1.3; RS-232 interface. \$49.95 direct, \$24.95 through CompuServe. Copy protected? NO. Saturday Software, P.O. Box 404, Catlettsburg, KY 41129; 606/739-6088 (voice 9 A.M. — 6 P.M.; call via modem after 6 to inspect documentation for free).

Even owners of the most sophisticated communications programs don't always bother to log off the network, exit to a word processor, write a message, save the file, log back in and send the message. Instead, they type the message into the network's clunky line-by-line text editors while still online, squandering connect time to do so. Split-screen programs let you stay logged-in while you type a reply with a word processor. As text comes in (and gets saved to disk, perhaps) on the bottom screen, you type your messages on the top screen. It sounds like it might be hard to concentrate, but most people ignore half of what comes over the networks anyway. The ability to type messages and receive text simultaneously is a boon. We recommend two split-screen programs: *Post-Plus* for CP/M, and *DBLCOM* on TRS-80s. We also hear good reports about *ZLYNK* (\$59.95 from Software Wizardry, 122 Yankee Drive, St. Charles, MO 63301), which is only available on Heath/Zenith computers.

Post-Plus is new, and too complex for neophyte users (its extremely versatile command language is difficult to learn, but will let you automate all daily telecommunications into one gargantuan command). The built-in word processor is limited but serviceable. CP/M-based expert networkers can modify *Post-Plus* into a highly customized communications tool. —AK

I use *DBLCOM* on the TRS-80 Model III. It is an upgraded version of *DBLTALK*, which is available by phone from *CompuServe* for \$15. If you've ever gone to *CompuServe's* CB section (in which users who are online at the same time send each other one-line messages), you may note that while you're trying to type a one-liner, another message comes zooming in, splitting your words in half. It's very confusing! Saturday Software solved the problem with a split screen that allows you to write your message at the bottom of the screen and, when you have what you want, to send the whole line in a single burst. Similarly, you can use it to type a reply to a longer message while still reading the end of it. *DBLCOM* can also save incoming text to disk, and send *Scipsit* text files from your disk to a remote system. These files can be sent a line at a time or a whole file at a time. Autodialing is available with the proper modem. With conferencing becoming an important part of telecommunications, I think the split screen feature is important.

—Dave Peyton

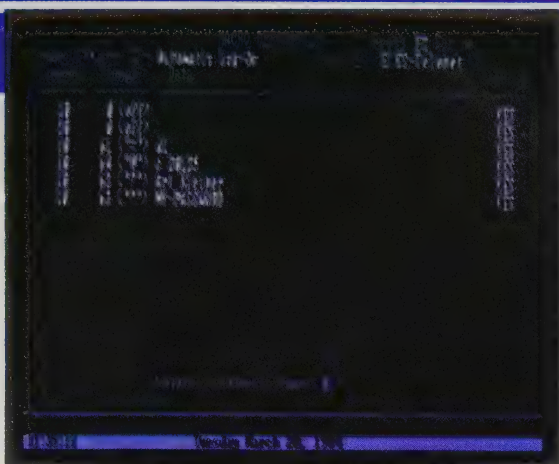


Post-plus, the split-screen terminal program, divides the screen into three parts. At top are Post-Plus' own commands; in the center, its word processor; at bottom, the terminal program, showing a comment from the EIES network inquiring about Timothy Leary's new software.

Hayes Smartcom II

IBM PC, IBM PC XT;
Corona; Compaq PC; Texas
Instruments Professional; PC
DOS. \$149. Copy protected?
NO. Hayes Microcomputer
Products, 5923 Peachtree
Industrial Blvd., Norcross,
GA 30092; 404/441-1617.

The Smartcom II chart for creating an automatic log-in sequence. For each step, you fill in how long to wait for each prompt, the prompt character, what you type in reply, and whether or not to add a carriage return.



In praise of Hayes: About 75 minutes after I opened the Hayes Smartmodem 1200B package (with a single-board modem and *Smartcom II* software) I was logged on to *The Source*. That included installing the board in my PC and following the instructions in the software manual for creating my automatic command to dial up *The Source*. I had never telecommunicated before, and it really reduced my anxiety about the whole business to use the modem so quickly.

Smartcom II and the Hayes 1200B modem have performed flawlessly for eight months. I use CompuServe, EIES and Dow Jones and transfer information regularly from my Radio Shack 100 to my IBM PC. Another psychologist and I easily exchange word-processed text files. With Hayes I can receive a file from another computer, name and store it, and then take the next file in the same way. When I tried *PC: IntelliCom*, I had to take all the files in one string, because it doesn't let you stop to name and store anything until you hang up.

It seems that every time I want to do one more thing with a communications package, I discover that *Smartcom II* has the feature. The only thing I might like to do that I can't do with *Smartcom II* is toggle back and forth between voice and data transmission in the same call.

— Charles Spezzano

Like its closest competitor, *Perfect*

Link, *Smartcom II* comes with prewritten command sequences for all the popular networks. To dial a network that *Smartcom*'s designers didn't anticipate, you need not master a special programming language; instead, you fill in a chart with prompts and replies. *Perfect Link* feels slightly easier, comes with more coupons for free connect time, and is beloved by Peter McWilliams, but I still chose *Smartcom II* because it's more versatile once you get running, and if something goes wrong it's easier to trouble shoot. *Smartcom II* offers many technical choices but the manual and menus explain them so well that using the program is an easy-to-swallow basic telecommunications course in itself. The menus rankle some experienced users. Even while connected to another computer, you must laboriously return to the menu if you want to send a file, receive text, or change telecommunications specs. But for many, the menus soon become second nature.

Hayes also makes an Apple terminal program called *Smartcom I* (when bundled with the Hayes Apple modem card) or the *Hayes Terminal Program* (when sold alone). It's simple and elegant, but has fewer features than the inexpensive *Data Capture IIe* (p. 17), so we don't recommend it. *Smartcom II* is so versatile and easy to use, it's a shame Hayes doesn't release it for more machines. —AK

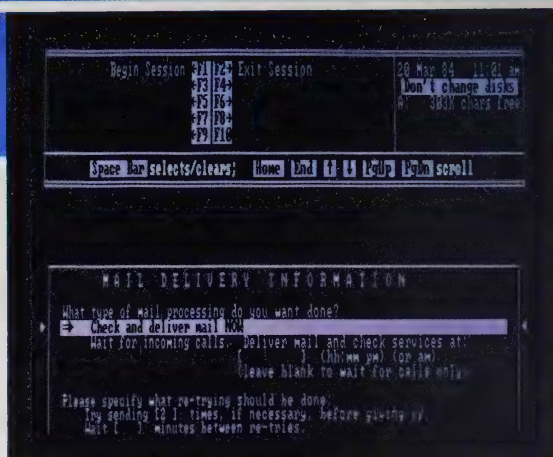
Transend PC; Personal Communications Manager

Any Transend- or Hayes-compatible modem; IBM PC, XT/compatibles (but not PCjr); MS-DOS. \$189. Copy protected? YES. Transend Corp., 2190 Paragon Drive, San Jose, CA 95131; 408/946-7400.

Personal Communications Manager: IBM PC (128K), XT, PCjr; PC DOS; any IBM-compatible modem. \$100. Copy protected? NO. IBM, P.O. Box 2989, Delray Beach, FL 33444; 800/447-4700.

Say you have people with IBM PCs spread over the country working on one project. They're not hackers; they can just about handle *Lotus 1-2-3*. You'd like them to exchange electronic mail — sometimes through *The Source*, but mostly by dialing each other's computers after they've gone to bed (none of them ever works late). But you don't want it to feel like "data communications." You want it to feel like walking down the hall and sticking a letter in the mail chute.

Two programs cater to this need. I recommend *Transend PC* because it's so damn cute. Its main screen looks like a desktop filled with in- and out-baskets and an address book containing every correspondent's phone number or network address. You pop in and out of the baskets like a mobile jack-in-the-box, typing letters on *Transend's* facile word processor. Then, at your cue or at a preselected time, *Transend* dials up a series of numbers, leaves messages where you want them and collects any that are waiting for you, tagging them separately. Each incoming message waits in your inbox until you read it and (if you wish) discard it. Then it goes to my favorite *Transend* feature, a holding place called the "waste basket"; to really delete it permanently, you must "shred" it. *Transend's* popularity proves that McLuhan



This is **TRANSEND** set up to log on to *The Source*, check for any messages and send the mail shown in its "out box." This can either be done immediately or at a specified time.

was right about new media imitating old.

Transend limits its mail system to two electronic mail networks: *The Source*, and *OnTyme* (see *IEMS*, p. 23). They may add others like *MCI Mail*. *Transend* has a general terminal feature similar to but less versatile than *Smartcom II*; it feels so prosaic next to the electronic mail feature that you might shrink from using it. Unfortunately, there's no way to send a *Transend* message directly to any other word processor, terminal program, or typesetting machine. You must first send it back to *The Source*, then pick it up again with another program. These limitations make it impractical for some, but those who can use it will chortle all the way to the keyboard. (*Transend's* Apple terminal programs are completely different; I haven't seen them.)

The other easy electronic mail program, IBM's *Personal Communications Manager*, was actually created by MICROCOM, which is trying to make its MNP protocol an "industry standard." Like *Transend*, *PCM* keeps a list of correspondents, dials each of their offices at prespecified times and exchanges general messages. It also has a competent general terminal program. Its advantage: it runs on the PCjr. If you want to exchange automated electronic mail between PCs and PCjrs, buy *PCM*. —AK

PC-TALK.III; Telephone Service Connection Terminal Program; Data Capture II

PC-TALK: IBM PC, most compatibles; autodial, acoustic modems (Hayes compatible). \$35. Copy protected? NO. Freeware/Headlands Press, Box 862, Tiburon, CA 94920.

Telephone Service Connection Terminal Program: Apple II, II+, IIe; Hayes micromodem, SSM modem card, or Zoom Telephonics modem. \$40. Copy protected? NO. Telephone Software Connection, P.O. Box 6548, Torrance, CA 90504; 213/516-9430.

Data Capture IIe: Apple IIe; all modems or serial cards. \$90. Copy protected? NO. Southeastern Software, 7743 Briarwood Dr., New Orleans, LA 70128; 504/246-7937.

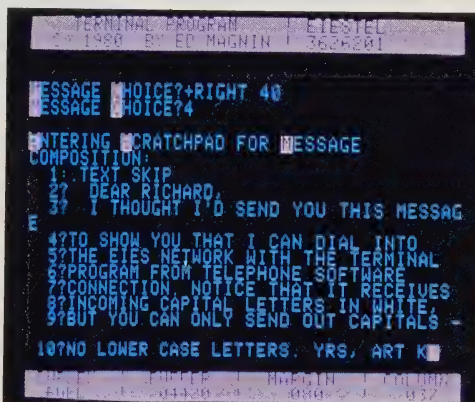
These three inexpensive programs are somewhat legendary for the large user communities that support them. They work from simple menus that don't get in the way: on *Data Capture IIe* and the Telephone Software Connection's *TERMINAL PROGRAM* you can bypass them when you need to, and on *PC-TALK* the menu overlaps your incoming messages, so you can see both. All three can dial up networks, log in when you touch a button, and send and receive text.

Compared to a *CROSSTALK XVI* or a *MITE*, these programs are limited; except for *Terminal Program*, they won't respond automatically to a network's prompts or keep a wide range of options on file. But it's too easy to be snobbish in evaluating software. Before I started this section, all three programs would have seemed unbelievably capable to me. They're still more reliable than most of the software I've tested. They're easy to use, work well with various printers and word processors, and have a cheerful, warm-hearted feeling.

You can only get *PC-TALK* by mail order. It's not exactly public domain, but program author Andrew Fluegelman (once Whole Earth's business manager, now project instigator at *PC World* and *MacWorld*) distributes it as "freeware." You get the program and

the on-disk manual for a \$35 donation. It's worth it. Fluegelman encourages owners to copy *PC-TALK* (but not for resale) and modify it; so there are dozens of public domain homebrew mutations of *PC-TALK*, including a split-screen version, one allowing 450-baud transmission, and ones that make *PC-TALK* emulate various mainframe terminals. (Has anyone set up automatic commands that can cause for a network's prompts? That's *PC-TALK*'s most blatant deficiency.) You can learn about the variations in the IBM PC SIG (p. 24) on *CompuServe*.

The Telephone Software Connection is a dial-up service that sends programs through the phone wires or by mail. You can get their *Terminal Program* either way. It has such an obvious method for setting up automatic log-in sequences it's amazing all programs don't ape it. You log in once by yourself, then type CTRL-A; thereafter the program remembers how to do what you just did. Setting up *Terminal Program* for your modem requires a wee bit of BASIC fiddling, and the program only supports 40 columns. If you insist on 80 columns, *Data Capture IIe* works fine. (There's also a *Data Capture PC*, but *PC-TALK* is cheaper and better.) —AK



Sending an IES message with *TERMINAL PROGRAM* (the blue-on-black text is all IES). The program displays the phone number and network name at upper right ("EIESTEL" means "EIES via Telenet") and how many characters have come through (under "BUFFER").

VIDTEX

Commodore 64, Pet; TRS-80 (I, II, III, IV, 4P, 12, 16, Color Computer and Color Computer 2); Osborne; Apple II family; IBM PC; Kaypro II; Prices vary: \$19.95-\$69.95. Commodore and TRS-80 versions: \$39.95. Copy protected? NO. CompuServe, 5000 Arlington Center Blvd./ P.O. Box 20212, Columbus, OH 43220; 800/849-8199.

The best Commodore 64 terminal package is VIDTEX. It has all the major functions — it stores incoming or outgoing text in a buffer, sends and receives from networks, controls baud rate and other transmission parameters, and has the CompuServe "B" protocol (which allows you to receive programs stored on CompuServe with their own scheme

for eliminating transmission errors). I have used some other terminal programs, but VIDTEX beats them all. You can even arrange it to boot up, automatically dial and log you on, and take you directly to any area on any system.

—Christopher Dunn

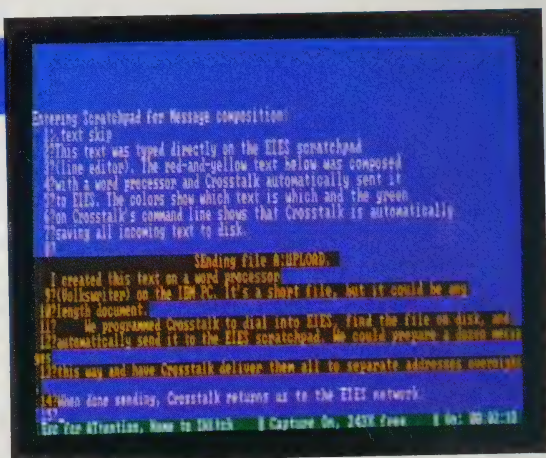
VIDTEX is very versatile. I use it with my Radio Shack Model II and with a variety of modems. Although the "B" protocol is only useful with CompuServe, the other features work with any network. I use it extensively with a time-sharing computer that has been known to corrupt other terminal packages with "garbage" characters — VIDTEX filters those out.

—Tom Coffey

CROSSTALK XVI/ CROSSTALK 3.0

Most CP/M and MS-DOS computers; Bell-compatible modems. \$195. Copy protected? NO. Microstuf, Inc., 1845 The Exchange, Suite 140, Atlanta, GA 30339; 404/952-0267.

Sending a file to the EIES network with CROSSTALK XVI, which allows you to choose the screen colors. The bottom right-hand corner shows that CROSSTALK logged into EIES two minutes and twenty seconds ago.



Criticizing someone's favorite data communications program is like criticizing their word processing program or religion; you just don't do it and expect to remain friends. Thus I avoid arguments with people who prefer terminal programs (like Smartcom II) driven by menus and log-on sequences that are already pre-established for them. Having cut my teeth on menu-driven PC-TALK.III, I now use CROSSTALK XVI on my IBM PC almost exclusively, because it is an expert system.

CROSSTALK doesn't force you to wade through vast levels of menus. You can summon all the program's commands from a single, unobtrusive command line

at the bottom of the screen, while the rest of the screen shows what's happening on the network you've dialed up. Despite what others say, I found CROSSTALK reasonably simple to get going and its command language (used to write instructions for communications tasks like dialing, logging on and saving text) is an absolute delight.

For example, I've written a CROSSTALK program that (when I leave my PC on overnight) waits for 3 A.M., dials in, checks my Source mailbox, holds my mail for me and hangs up. To check my Source mail in person, I type TALK SOURCE at the PC DOS "A >" prompt. CROSSTALK does the rest.

Modems

This list is preliminary. A detailed report on our recommendations will be printed in a future issue of the *Review*.

The Hayes Smartmodem (\$699 from Hayes Microcomputer Products, 5923 Peachtree Industrial Blvd., Norcross, GA 30092) and Anchor Signalman XII (\$399 from Anchor Automation, 6913 Valjean Ave., Van Nuys, CA 91406) — standalone 1200-baud modems — work with most computers and software. Hayes's Smartmodem is the kind of high-priced standard among modems that the IBM PC is among computers — their 300-

baud model sells for \$289.

The Anchor Volksmodem (\$79.95 from Anchor Automation) — a stand-alone, manual-dial 300-baud modem. A durable, inexpensive workhorse.

The Commodore 64 Automodem (\$119 from Commodore Business Machines, 950 Airport Road, West Chester, PA 19380) — autodial, works well for us, comes with mediocre but usable software. The Commodore Vicmodem (\$89 from Commodore Business Machines) — a good, cheap manual-dial modem; both are 300 baud.

IBM PC modem boards — all 1200-baud autodial. Choose the one that comes with the software you prefer. The Novation PC1200B board, called ACCESS 1-2-3 (\$595 from

Novation, 20409 Prairie Street, Chatsworth, CA 91311) comes with *CROSSTALK XVI* (p. 18). The Hayes Smartmodem 1200B (\$539 from Hayes Microcomputer Products) comes with *Smartcom II* (p. 15). The bargain-priced Qubié PC212A/1200 board (\$299 from Qubié, 4809 Calle Alto, Camarillo, CA 93010) comes with *PC-TALK.III* (p. 17). You aren't bound to these combinations (for instance, nearly every terminal program works with the Hayes Smartmodem board), but doublecheck before you buy to make sure.

Novation Applecot 212 (\$599 from Novation) — to our knowledge, the only 1200-baud Apple modem board. Works with nearly all software, and comes with its own (which we haven't seen yet). —AK

CROSSTALK can also function as a simple host system (with password protection), so I can dial my office and download files from my PC while I'm away. It supports both XMODEM and its own file-transfer protocols, and it controls file-transfer and micro-to-mainframe interaction as well as any program I've seen. But I enjoy *CROSSTALK* most because it has one of the cleanest user interfaces around: it feels right.

—John Markoff

CROSSTALK XVI frightened and frustrated me until I used its command files, which I avoided at first because you need a word processor to set them up. But then I was amazed at their power. Now, with two keystrokes, *CROSSTALK* logs me onto *CompuServe* and into our Whole Earth conference there; it asks whether I want to see new items or print out old messages for our library files; if I request old messages, it asks me which number I want to start at, collects

them, automatically saves them on disk, and logs off when it's done. It took about three hours to program this sequence; now it saves me hours every week.

One unexpected bonus: With a color monitor, you can preset the screen colors. The text coming in from the remote network, the text you send from your computer and *CROSSTALK*'s own commands all show up in different colors, so you know at a glance where the words on the screen come from.

CROSSTALK XVI is actually the 16-bit version of *CROSSTALK 3.0*, which is beginning to show up for other machines besides the IBM PC. *CROSSTALK 2.0* and *1.0* are much less capable, and I don't recommend them. Also, I've heard complaints about file transfers not working between different versions of *CROSSTALK*, so be prepared to fiddle some. But those flexible, powerful commands make this one my terminal program of choice on the IBM PC.

—AK

Break

Every terminal program should have a break key, used to interrupt unexpectedly long print-outs. Technically, a break is 200 milliseconds of space between characters.

When a host computer perceives that interruption, it stops what it's doing. That's the only way to interrupt a stream of unwanted text short of pulling out the phone cord. Instead of disconnecting you, the break should return you to your last place on the network. Recently I sent a friend

an extremely personal message about her love life, which happened to arrive during a network demonstration to some visiting acquaintances. "Interest in the room peaked," she wrote me later. "Never did a hand go for a break key as quickly as mine did."

—AK

ASCII Express "The Professional;"

Apple II, II+, IIe, 48K.
\$129.95. Copy protected? NO.

Z-Term "The Professional"

Apple II, IIe (requires CPM/80 card), 48K.
\$149.95. Copy protected? NO.

Both from: United Software,
1880 Century Park East, Suite 311,
Los Angeles, CA 90067; 213/556-2211.

Though complex, these two smart terminal programs from the same publisher are the best available for the Apple. If you're new to computer communications, their more esoteric features — a command that automatically creates new disk files for saving incoming text, another that shows control-key codes on the screen — probably won't make sense. They'll come in handy, though, as your needs and abilities grow. Of the two programs, *ASCII Express* is a bit friendlier,

and has more features: choose it if you use Apple DOS, and *Z-Term* if you have a Z-80 card and use CP/M on your Apple.

AE Pro (as it's usually called) has a built-in text editor. It can answer and dial the phone while unattended. You can leave it running and dial in from another computer to swap files. It also has built-in help screens.

Z-Pro (as users call it) assumes you'll use a CP/M writing tool (like *WordStar*) to generate text; it has a very limited autoanswer capability and no "help" messages.

AE Pro/Z-Pro's achievement, and its Achilles heel, is the procedure for setting up "macros," the routines for automatically logging onto a remote system. They're more versatile than those of most other programs and they work fine, but in order to use them you must learn what amounts to a mini programming language. The manuals give this procedure only a brisk once-over. In general, the manuals are aimed at experienced users; if you're a novice, count on finding outside help. But both programs are well supported by their publisher; once I called with a question on *Z-Pro* and found myself talking to Bill Blue, the program's author. —Louis Jaffe

We haven't seen *Z-Term* here, so I don't know how it compares to *MITE* (p. 12) for Apples running CP/M. If in doubt, I'd recommend *MITE*. But both *ASCII Express* and *Z-Term* have many fervent supporters who have used them for years. We've heard some bug complaints, but also reports of good support service from the publisher. —AK

UNATTENDED/REMOTE PARAMETERS

```
C = Ring count before answer ..... 1
D = Unattended answer on boot ..... NO
O = On-line run (see manual) ..... NO
R = Remote password: AE
S = Slots remotely accessible:
  4 5 6
W = Read Welcome file in remote ..... NO
X = Exit
Choice? _
```

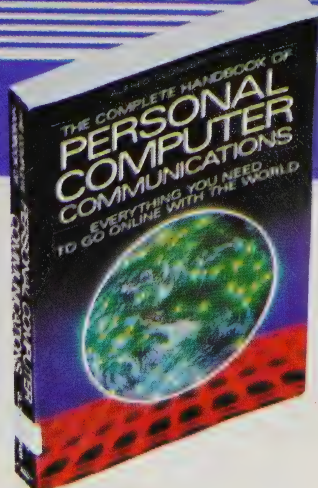
ASCII Express can be set up to answer calls and exchange files unattended.

The Complete Handbook of Personal Computer Communications

Still the best of a genre that it created last year. There is so much that nobody tells you about in computer communication unless you know what to ask: how to compare networks, how to find the particular conference you need, how to connect your computer to someone else's typesetting equipment or directly to another computer.

This book compares the major systems — *The Source*, *CompuServe*, *Dow Jones*, bulletin boards, *DIALOG*, *NewsNet*, *EIES*, etc. — and describes what they can do for you and how they fit into the general computer/networking culture. Author Alfred Glossbrenner (he also wrote *How to Buy Software*, p. 28) explains technical details particularly well (mysterious things like "parity" and "XON/XOFF" that you need not know about until something goes wrong). Already *The Complete Handbook* is somewhat out of date, but Glossbrenner promises to update future editions. The book's enthusiasm and clarity will never age.

—AK



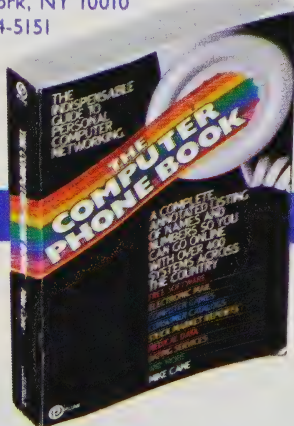
The Complete Handbook of Personal Computer Communications

Alfred Glossbrenner
1983; 325 pp.

\$14.95 from:
St. Martin's Press
175 Fifth Avenue
New York, NY 10010
212/674-5151

The Computer Phone Book™

Local bulletin boards are the best networking bargain — they're free — and often have the most interesting discussions. There are lots of perfunctory directories to bulletin boards, but Mike Cane is some kind of strange madman who seems to have actually called 1500 computer bulletin boards, of which he describes 450. When they bore him, he tells you ("There is nothing interesting on here. If you call this system, try to leave an interesting message.") When they enthral him, he shows it ("If you stare at the stars and long to go into orbit, give this system a call to meet some kindred spirits.") He explicitly states when they're worth a long-distance phone call. *The Computer Phone Book™* contains an excellent guide to the commands you'll encounter on bulletin boards, and a pretty good guide to getting around



The Computer Phone Book™

Mike Cane
1983; 466 pp.

\$9.95 from
New American Library
1633 Broadway
New York, NY 10019
212/397-8156

CompuServe, *The Source*, *Dow Jones*, *Delphi*, and several dozen fascinating-sounding regional networks. He even lists international bulletin boards. He also publishes a monthly newsletter, *The Computer Phone Book Update*. —AK



ELECTRONIC

MCI Mail

If you own a modem or telephone terminal, you should join *MCI Mail* — joining and receiving messages costs nothing, and you'll be saving all your telecommunication-addict friends money. It costs \$1 to send an *MCI Mail* message to someone's terminal, and \$2 to send a message that MCI prints out and drops off as regular first class mail. Higher rates ensure more rapid hand-delivery; for a short manuscript that *must* be across the country tomorrow, *MCI Mail* is probably the cheapest (\$6) overnight message-delivery service. Significantly, Purolator Courier works with *MCI Mail*, not against them.

MCI Mail is the easiest online system I've ever encountered. I sent mail successfully two minutes after I signed on the first time. You can even send messages over the TELEX network easily, for about \$2 extra for most

countries (\$1 in the U.S.). Finding subscribers' addresses is tricky, though; *MCI Mail* needs a better directory. As with other electronic mail networks, you can send the same message to twelve people as easily as one, but be wary: *MCI Mail*, unlike *The Source* or *IEMS*, will charge you for twelve letters!

—AK

(Suggested by Russell Schweickart and Harry Newton)

SourceMail

The oldest electronic mail system for personal computers is still the most versatile and remarkably easy to use. (*CompuServe* also has electronic mail, but it's so clumsy that many members use the *SIGs* [p. 24] to send messages to each other.) When I need to reach someone who belongs to several networks, I usually choose *SourceMail* first. As with

The Personal Effects of Networking

First there's uncertainty. "Did my message go through all right? Did I send it to the wrong person? Is it *really* private? How do I sign off this thing?"

As you feel more secure, pleasure takes over. The flow of ideas is exciting and flattering. "I posted

my query at 10 and by noon there were seven replies waiting!" You step into the rarefied atmosphere of a literary correspondence — but one faster, more immediately engaging, and easier to keep up with. Mutual projects and opportunities blossom quickly,

without regard for geographical distances.

Some people move on to addiction: signing on a dozen times a day ("maybe something is waiting"), cutting back offline relationships because they're less convenient ("if they're not on the network I don't want to talk to them"), running up unexpectedly large connect-time bills, merging work and home lives so they can sign on at night, and even dreaming about the network.

MAIL PROGRAMS

MCI Mail, you can learn to send and receive messages within minutes. Since you pay by the minute, it's worth typing your messages on your word processor and transmitting them with your communications software. *SourceMail* offers a wide range of alternatives — you can reply to messages as you read them, copy them to others, keep lists of groups who will all get one message, or "express mail" your message so it goes to the front of the receiver's incoming queue. —AK

International Electronic Mail Service (IEMS)

Large businesses buy bulk accounts on worldwide electronic mail systems — Tymshare's *OnTyme* system, ITT's *Dialcom*, and the three or four interwoven TELEX services. Small businesses and individuals can tap into the same

services with resellers that pay the hefty minimum costs and bill their accounts for the portion used, just as phone services like *SPRINT* do. They also (like *MCI Mail*) print your message at a faraway post office for delivery as first class mail. So far, *IEMS* seems to offer the most services at the lowest cost: flat charges of \$50/year and \$5/month per mailbox, plus \$3 per hour, and a quarter for every 1000 characters you send or receive. Overseas TELEX costs a few dollars more, but is still cheap compared to overseas phoning.

Unfortunately, *IEMS* uses *OnTyme*'s arduous command system (to see instructions, for instance, you type `EXE **HELP`). To get around this, you can automate your own communication software to translate *IEMS*'s commands into something reasonable. (Even as is, they're easier than dialing into a TELEX network directly.) —AK

Fortunately, addiction is usually short-lived. You get overwhelmed by overload and cut back, learning to filter out material. You don't have to lose appreciation for the physical world; you can become more sensual elsewhere to compensate for the hours spent online. You can use the telephone more sparingly, scheduling calls and exchanging agendas for them in advance.

Networking is catnip for people who com-

municate best by the written word. Good writers have charisma. Mediocre writers improve. Pushy or insensitive writers get ignored. Avid readers are always engaged. People learn to articulate their emotions more explicitly to avoid being misunderstood. Race, gender, shyness, disabilities, age, and physical presence all lose importance.

Since you don't need an appointment to reach someone via computer network, you come to feel

that everyone is always accessible. But you also learn not to pressure people — they'll just shrug and ignore your message. For most participants, the increased contacts break down old hierarchies and make unforeseen relationships possible — like the corporation vice-president and the college student who swap tips on playing *Archon*. The key impression is one of civilization — more precisely, a new way of being civilized. —AK

COMPUTER CONFERENCING SYSTEMS



*Electronic mail is good for passing messages, but less useful for ongoing electronic group discussions. Exchanging messages directly among a dozen people is like holding a seminar in a corridor. A computerized conference, on the other hand, maintains a transcript that automatically keeps track of each member's place and shows everyone what they haven't read yet. Use conferencing to share research on a particular topic, to coordinate an ongoing project that's spread across the country, or to look into new interests. You can set up a conferencing system on your own computer and then dedicate it to that use, leaving it online all day. (To see such systems, dial up a "Conference Tree" as described in *The Computer Phone Book* on p. 21.) Established dial-up computer networks like *The Source* and *CompuServe* now include conferencing, which saves you the trouble of maintaining your own. We're listing three systems, all somewhat complex, but worth the time and money to explore.*

—AK

CompuServe Special Interest Groups (SIGs)

The several dozen public SIGs on specific topics are like benevolent fiefdoms, each with a presiding duke (called a sysop, for "system operator") who fields questions and manages the flow of information. A SIG can weave up to eleven thematic threads and members choose how many to follow. The begin-

ner's menu makes the fairly complex commands masterable in less than an hour (regular users will want the SIG manual, at \$3.95 extra). The immense range of SIG topics includes every type of computer imaginable (4 for TRS-80s, 2 for Commodore, 1 each for Apple, IBM PC, CP/M, Epson, even a Panasonic group) plus such diverse interests as environmental issues, music, religion, animal

care and working at home. You can start your own public or private *CompuServe SIG* for \$500-\$1000 per month, an absurdly high charge which will hopefully come down. *CompuServe* only stores about a month's worth of back discussion, so you can't use *SIGs* to keep archival records of a group's progress. But the sysop can archive some longer information (many of the computer *SIGs* keep public domain software for people to gather by phone and use). If you're curious about conferencing, check out *CompuServe SIGs* first.

—AK

Participate-on-the-Source (PARTI)

PARTI is the most freewheeling of the computer conferencing services. Unlike other conferencing and bulletin board schemes, it allows any user to start a public or private conference on any topic at any time. Despite frequent technical problems and a command structure that baffles even old *PARTI* hands, *PARTI* has become one of the most popular branches of *The Source*.

For example, both the Korean airliner attack and the Grenada invasion spawned *PARTI* conferences which attracted hundreds of answers in a few days. Surprisingly, some of the items came from well-informed military and intelligence people. These discussions subsided after a couple of weeks, but other *PARTI* conferences have gone on for many months, on topics as diverse as the UNIX operating system, interpersonal relationships, and the nature of language.

Somebody in a *PARTI* conference once compared this system to watching TV. If I knew where to begin looking, I'd retrieve that item and credit its author. The analogy is correct, and scanning *PARTI* is like watching TV commercials — a jumble of briefly presented, often unrelated topics. As new conferences branch spontaneously from old ones, you can get pulled into the flow and lose track of time (which is why *PARTI* is a good revenue generator for *The Source*). But unlike TV, *PARTI* is interactive. You

respond to conference items, and start new topics anytime at no charge beyond your connect time. It's as if you were lost in the aisles of a giant information department store. By the time you find your way out you're carrying a shopping bag full of ideas, assertions and inanities.

—Louis Jaffe

Electronic Information Exchange System (EIES)

A nonprofit computer-based conferencing laboratory, *EIES* feels to its members like an online village. Though you might join as part of an isolated working group, *EIES's* structure encourages you to mingle messages with as many members as possible. The *EIES* directory, for instance, is unique in that it asks each member for a self-descriptive paragraph rather than *The Source's* few terse "interest words."

EIES conferences are more flexible than *CompuServe SIGs*, and easier to comprehend than *PARTI*. "Pen names" are permitted (surprisingly useful if you want honest criticism) and elaborate search commands help you recover all the comments written by a particular author, or in a particular month, or on a particular topic. *EIES* has moderators to maintain the flow; conferences don't branch off in a dozen directions as with *PARTI*. The *EIES* community is 2000 people, much smaller than those of *The Source* or *CompuServe*, but more tightly knit.

EIES's connect time rates are low — it's the \$75 monthly membership charge that makes it too expensive for casual use. Since the system is experimental, some commands shift and change, but the basic menu structure stays constant, and new users can pick it up in an hour or two. I'm unabashedly biased towards *EIES*; we organized the *Software Review and Catalog* and met many of our best contributors there, and we use it to share software evaluations. *EIES* is the best system to bring a group of people together or to make a project happen.

—AK

This chart shows the relative costs for online networks reviewed in this issue. Information and membership are available from: CompuServe, 5000 Arlington Centre, Box 20212, Columbus OH 43220, (614) 457-8600; International Electronic Mail Service, 21686 Stevens Creek Blvd., Cupertino, CA 95014, (408) 446-4367; Electronic Information Exchange System, New Jersey Institute of Technology, 323 High Street, Newark, NJ 07102, (201) 645-5503; MCI Mail, 2000 M Street NW, 3rd Floor, Washington, DC 20036, 800-MCI-2255; and The Source, Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102, 800-336-3330.

		CompuServe	EIES	IEMS	MCI Mail	The Source
Initial charge		\$19.95 (includes one free hour)	N/A	\$100†	N/A	\$100
Monthly charge		N/A	\$75	\$10	N/A	\$1
Connect-time, per hour	Business hours	\$12.50 (300 baud); \$15* (1200 baud)	\$7.50	\$3	N/A	\$20.75 (300 baud); \$25.75 (1200 baud)
	Evenings/weekends	\$6 (300 baud); \$12.50 (1200 baud)	\$3	\$3	N/A	\$7.76 (300 baud) \$10.75 (1200 baud)
Charges per message sent		N/A	N/A	25¢/1000 characters‡	\$1✓	\$9 connect-time monthly minimum
Charges per conference		\$500-\$1000 per month☆	\$15/month★	N/A	N/A	\$10/month★

* \$2/hour surcharge if you use a different transmission network than CompuServe's own.

☆ Depends on whether the SIG includes extra text databases.

★ Approximate figure. Rate depends on amount of text stored in conference.

† \$50 per account. IEMS has a 2-account minimum. The \$10 monthly charge also covers

two accounts. IEMS also charges \$2-\$4 extra, depending on destination, for each TELEX message.

‡ An average-sized message (250 words) costs 50 cents.

✓ \$2 for delivery as first-class mail; \$6 and up for overnight delivery via Purolator.

Virtual Business

by Robert Cowan

Until last year I used my computer only to enhance my personal productivity (with word processing, electronic spread sheets, graphics, and data base management). I joined *EIES* (p. 25) simply to discuss new ideas with other members of the system. Then one of my *EIES* friends asked me and several others online to help him with a project. He had to evaluate a satellite teleconference and wanted observers in several major cities to report their findings. The process was amazing. Most of the observers had never met, but within 24 hours of the event we entered reports from each site. During the following week, we exchanged messages on the nature of satellite teleconferencing and strengths and weaknesses of the medium.

In the blink of an eye, my friend had expanded his firm's payroll to meet a task, "picked our brains," and let us go our separate ways. I soon began to speculate on the feasibility of using this form of communication to create what I call a "virtual business." I had heard the word "virtual" in connection with computers before. "Virtual Memory Systems" use both the computer's memory and disk drives to create the illusion that the memory of the computer is much larger than it really is.

In a virtual business the employees would come from a pool of qualified people (individual entrepreneurs, if you will), who would assemble quickly to meet a task and disband at the project's conclusion — creating the illusion that the firm is larger than it really is. A virtual business could be as large or small as the current workload; its number of employees could vary on a daily basis.

Six months ago I started a project on *EIES* to test the concept.

I was starting my own business and opened a private conference called "New Ventures" so that a few *EIES* members could help me discuss potential projects in which we would all share the profits. New concepts were introduced, outlined, discussed, focused and developed into business plans. We are now beginning to apply the results of the conference into a viable business enterprise. As time goes on I can draw upon the expertise of more than a thousand creative *EIES* members, experts in their field, so that my firm can offer the best to my client population.

I believe we will soon see the emergence of "electronic store-front firms" where potential users will look through a computer network's directory for service providers and contract with the most appropriate one. That provider might be located on a farm in Washington or in the heart of New York City. Geography is becoming less important as our focus shifts to the real commodities of the information age — human intelligence and creativity. **END**

How to Buy Software

The able Alfred Glossbrenner who made the intractable world of telecommunications tractable (see *The Complete Handbook of Personal Computer Communications* review, p. 21) is back, illuminating an even greater darkness. Right now this is the best book for finding out what personal computers can do for you and for tracking down the right software for your unique uses.

The book amounts to a do-it-yourself *Whole Earth Software Catalog* (which he anticipatorially — trustingly! — reviews favorably). I am reading the book from cover to cover. The covers are 648 pages apart, so this is taking a while.

How to Buy Software is dense with good information and good advice, but not heavy. It keeps you reading with its abiding cheerfulness and a rich sprinkling of tidbits of news that make the reader go "Hm! Didn't know that!" and turn the page looking for another. The range of the book is outstanding: nearly everything that runs on personal computers, so Glossbrenner not only gives good counsel within each category, he tells you how to connect them intelligently and advises when to look for a cheaper or better way to do something over in another domain of software or even outside of your computer. For checkbook balancing, for example, he has high praise for pocket calculators.

This is not a book of evaluations: it's a book of evaluatING. Glossbrenner throws in many of his own judgements, complete with access to what he's recommending, but his major intent is to instruct and inspire readers to make their own evaluations. He has in inspiring abundance the qualities I look for in a software reviewer: 1) he has the knowledge; 2) he has good judgement; 3) he writes well. Besides covering thoroughly all the major kinds of software, the book is brief but quite useful about such subjects as computer magazines (16 pages), free software (24 pages), and on-line (telephone accessible) software reviews (4 pages). Understandably, he

leaves the subject of hardware alone. It's worth another book — which I hope he'll do — and this one is surprisingly full-service with the specifics of hardware in the background.

—Stewart Brand

Excuse me. I'm back to rave in your ear that this book is even better than I thought after my initial hour or so of sampling. Now that I'm two-thirds through, I can affirm — not just hope — that it is the definitive software shopper's guide for now. (If not updated, it will begin to age a bit by Christmas '84 — due to be a season of terror in the computer business.) What it has that will not rot for a while is the best *General Introduction* to personal computers that I've seen, all of it put in terms of what a shopper needs to know. At last you will know, for example, why a program written in machine language is faster and more expensive than one written in a "higher level" language such as Pascal, and why it is probably worth the extra cost. (*Lotus 1-2-3* and *WordPerfect* are written in machine language; *Context MBA* and *Volkswriter Deluxe* are written in Pascal and are a tad slower. Those tads add up.)

Glossbrenner offers good overall strategies as well as good specific tips. For intelligence and thoroughness no one else comes close.

—SB

- If you have never sat in front of a computer waiting and waiting and waiting for a cassette-based program to load in, you owe yourself this experience before deciding to use a tape recorder as a mass storage device. Ask a salesperson or a friend to give you a demonstration. Perhaps the best thing that can be said about a cassette tape recorder is that it is so cheap that you won't be out all that much money when you get fed up and replace it with a floppy disk system.
- **SoftTip:** The "Freeware" concept that has made the communications program PC-Talk such a success has been extended to file management programs by Jim Button with his PC-File. This is a powerful, user-friendly program for the IBM PC with all the features of a file management program costing \$150 or more. At a suggested contribution of \$35, it is an incredible value.

You may be able to obtain a copy of it from a friend, but since Mr. Button keeps improving the program and adding additional features, you would be best off sending for your own. (Updates are announced regularly and are available for \$6 if you send a blank, formatted disk. Be sure to specify single- or double-sided.) Contact:

Mr. Jim Button
P.O. Box 5786
Bellevue, WA 98006

Suggested contribution: \$35

• In many cases, the best answer to the question, How should I buy personal finance programs? is DON'T! Instead of sinking \$150 or \$75 or even \$19.95 into a personal finance program, save your money and spend it on a word processing program and an electronic spreadsheet. A word processing program can be used to write your monthly checks automatically, and an electronic spreadsheet can be used to balance your checkbook, to display your budget, and to provide home accounting functions. In short, with these two programs you can accomplish everything that is of any real value in personal finance software, and a great deal more besides.

- Here are the errors you should deliberately make to try to break a program:
 - ★ Hit a wrong key when offered an onscreen menu.
 - ★ Place your whole hand on the keyboard to hit several keys at once at various opportune moments. Try to pick a time when the program is doing something important, like calculating or accessing a disk drive. These can be its most vulnerable points.
 - ★ Narrow your focus and hit just the {BREAK} [{SHIFT} {BREAK}, on some machines] key at various unexpected times. Do the same things with the {ESCAPE} key.
 - ★ The explanation of this one is slightly technical, but once a computer has "opened" a disk file, it usually must "close" it properly in order for you to be able to use it again. When you "quit" or "exit" a program, it should automatically close all files. The process involves placing some signals on the disk.
 - ★ So what happens if you hit the {RESET} key, or its equivalent on your machine, without formally "quitting" the program? If the programmer was on the ball, he or she will have included instructions to tell the software to automatically close all files.

4 Test it by creating a short file and

recording it on disk. Bring it in again and begin using it. Then hit {RESET} to cause the program to stop and reboot. Then see if you can bring the file in again or if you get an error message.

- ★ Try entering letters when the program calls for numbers and vice versa.
- ★ What happens if you type in a filename that is longer than the program will permit?
- ★ Ask it to load in a disk file that you know does not exist.
- ★ Deliberately leave the data disk out of its drive and ask the program to load a data file. Does the program notify you of your error, or does it simply stop working?
- ★ Will the program run if the printer is not connected and turned on? Amazingly, some of them won't. Test it both ways. If the program requires the printer to be online, what will you do when your printer is in the shop for repairs?
- ★ Does the program choke if you type your commands rapidly? If it does, the programmer has neglected to set aside a portion of memory as a "keyboard buffer" to store keystrokes until the program can act on them. (This could be caused by a lack of sufficient memory in the computer itself.)

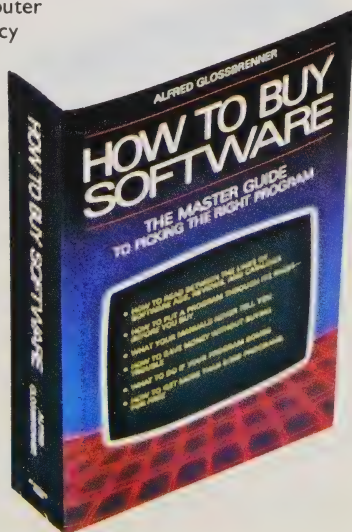
How to Buy Software

Alfred Glossbrenner
1984; 648 pp.

\$14.95

from: St. Martin's Press
175 Fifth Avenue
New York, NY 10010

or from
Computer
Literacy



THE NEW HOME COMPUTERS

Hardware has to be a primary consideration

Common wisdom says you should pick out the software you want, then find a computer that will handle your choices. That's a brazen and misleading oversimplification.

When you buy a computer, you make a decision (like it or not) about what part of the software universe you will be able to access — and you have to think about what programs you may need in the future as well as the present.

Computer "families" tend to be mutually exclusive because of the operating systems they use. There's the Apple II/Apple DOS family (which, by the way, is incompatible with the Apple III and the new Macintosh/Lisa combine); the Radio Shack family (with a number of units that can't talk to each other); the 8-bit CP/M family, which was the first attempt to standardize computers so software could be "universally" available; Commodore's 64 — incompatible with everyone else, including other Commodore products; the IBM PC family, based on the MS-DOS operating system, and the Macintosh/Lisa lash-up.

These are the groups that have sold enough machines to generate software developers' interest and ensure a continuing flow of programs. Yes, there are a lot of Sinclair/Timex machines and a loosely connected, expanding group of computers that use the UNIX operating system, but the software in both cases is limited.

That's why a software magazine has to cover hardware. You can't make software decisions in a vacuum.

Two new computers, targeted for the home, have been grabbing a lot of press lately — IBM's PCjr and Apple's Macintosh. In fact, the competition between these units sometimes sounds like a holy war; IBM as the all-powerful infidel and Apple dressed in white. We'll let you deal with the emotional side of this conflict and focus on the comparative value each unit offers. A third new system, the Coleco Adam, is reviewed because of its low cost and, again, the massive hype it is getting.

As a comparison, we've included a look at the Commodore 64 (generally agreed to be the largest selling home system ever).

As usual, one system won't fit everyone. Think about what you want to do (be honest, don't get a TRS 80 Model IV if you are really interested in computer games) and match those needs with the best combination of features, value, and galaxy of software.

(NOTE: The venerable Apple II [whether "plain," "+," or "e"] deserves your attention as well. Underpowered by today's standards, it is nevertheless backed by the wonderful advantage of 15,000 available programs and rafts of peripheral equipment. As prices for the Apple II trend downward (and they will this year), watch Apple II for a particularly good bargain.)

—RD

Many people took us to task for a seeming indifference toward the Apple Macintosh in Issue #1. Not true. We were caught, by deadlines, in an uncomfortable squeeze that prevented any meaningful review of the then-unannounced Mac.

It's worth emphasizing that we view our role as identifying what is best (not newest) in this fast-moving industry. People who rushed out and bought the (few) Macs in the computer stores found a fascinating machine with two (or three, if they were lucky) programs available for it.

That will be remedied shortly. And our coverage of the expanding Macintosh software base will be continuous. No argument about whether the Mac's worth covering — its price, performance and potential make it the most significant single announcement in the last two years. —RD

Breaking the Chains that Bind

by Charles Spezzano

As a man whose life has been a succession of struggles with orthodoxies (Catholic, Freudian, IBM PC owner), anything that smacks of heresy and change makes me more than a little uncomfortable. So, having defended the merits of the IBM Personal Computer in the pages of this journal, and having even started a society of like-minded PC software fanatics, I carefully ignored the year-long media blitz by Apple, up to and including the Superbowl extravaganza, heralding its new baby-Lisa computer. But with their usual lack of understanding for my neuroses, the editors of the *Review* set me face to face with little Mac.

It wasn't hard to find the Macintosh display at my local computer store. Subtly positioned five feet from the front door, with a giant multicolored apple hanging over it, was a new desk, surrounded by a crowd of salespeople and customers. In the midst of this throng of disgustingly excited admirers was a screen showing a little smiling icon. A salesman who had apparently landed a place on a long waiting list of eager Mac buyers was showing off the machine that

would soon be his.

Arms crossed in determined resistance, I listened as he exclaimed, "See how visual it is. The icon of the diskette means that Mac wants you to insert a diskette. Look at these great diskettes. Shirt-pocket size, encased in a hard plastic cover so you don't have to worry about those paper sleeves you need with IBM's diskettes." Cheap shot, I thought. He'll pay for that. "Speaking of disks, where's the other disk drive?" I know how to hurt a guy.

He looked appropriately sheepish: "It only comes with one disk drive, but Apple promises an external second drive that will be available by . . ."

I knew I had him on the run: "Are you kidding? Only one disk drive — for \$2500!" The crowd was on my side. "Yeah," said one serious prospective buyer taking notes on a legal-size pad. "How many disk swaps does it take to back up a disk at the end of the day if you've only got one drive?" Slinking into his seat, the sales guy mumbled something that sounded like "seven or eight." I let that one go. He had suffered enough.

The rest of the crowd wasn't so sympathetic. The woman beside me asked how many lines he could fit on the little nine-inch screen. That was too much even for me. "A nine-inch screen can be okay if the resolution is good," I offered in defense of this helpless fellow male. "Let's see something." With relief and obvious gratitude he slid his hand over to the mouse and rolled the arrow across the screen to an image of a diskette labeled by the words "write/paint." After a few more rolls and clicks, his hands were back on the keyboard and he was filling a cool light-grey screen with sharp, black letters.

That was the first time I noticed it — a small twinge of desire (or maybe jealousy) in the pit of my stomach. As nice as it is, my IBM PC's monochrome screen display looks exactly like a computer monitor. Images on cathode-ray tubes should be Redfords and Streisands, not words. Words belong on paper: black ink on a white background. Mac's text screens look just like the ordinary pages of books I have been reading all my life. And compared with those bright green or amber letters, Mac is cool. Not cool as in jazzy, but cool as in my eyes won't feel like little flames after

looking at Mac's screen for three hours. More than the little beige mouse or the two-inch-high curly letters, this cool screen could convert me to writing with Mac.

My real conversion to Mac, however, wasn't spurred by anything the salesman showed me during the demonstration. I realized it on the way home. Mac has sex appeal, like an Italian sports car: it's compact, stylish, soft and quick looking. Even without knowing exactly what I'd do with it, I'd like to have Mac sitting on a table in my living room. I might keep the PC in my office for serious work, but little Mac would be there to greet me every night when I got home.

If I could get near it, that is. My wife and daughters would love this machine. They respect the PC, but no one loves anything made by IBM. I think that may even be an official psychiatric perversion. You use a PC when it's time to work, but no one in my family would be able to keep their hands off an available Macintosh for very long — it invites you to play with it. And if the word processor got played out after a while, *MacPaint* would keep them entranced for quite some time.

I am not artistically inclined. My elementary school art teacher often suggested that I use the little cut-outs of birds and flowers she had available for tracing rather than try any creative drawing. Even now I only doodle in straight lines. But *MacPaint* stirs some latent artistic urge in me. It's one terrifically simple and powerful graphics program. My wife, who is a professional artist, and my older daughter, who in her better moments is a chip off the old maternal block, would embrace Mac's electronic easel and never let go. I'd have to get two mice, one for each of them. Even for \$3,500 (with a second disk drive and a printer), adopting Mac as our second personal computer is definitely in my family's plans. END



Not a Toy but the Real Thing

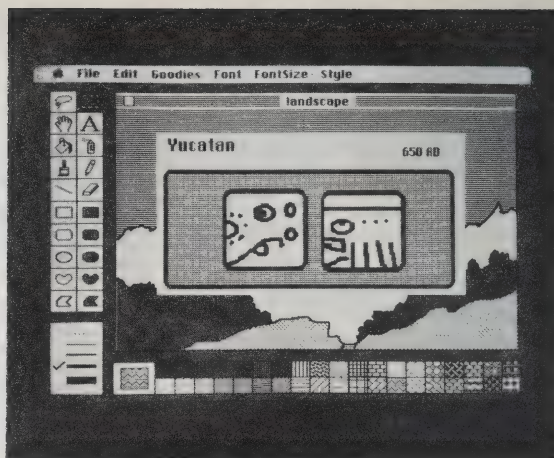
by Clifford Barney

Apple Computer's new Macintosh is a professional computer you can own, an affordable (but not inexpensive) version of the kind of machine computer scientists and engineers have been using for several years. What do the pros have that the rest of us don't know about? Essentially, equipment that is easier to use and more powerful: Instead of alphanumeric displays, these machines display bitmapped graphics on high-resolution screens. A mouse or other pointing device for entering commands. Easy transfer of data between files through windowed software. A 32-bit microprocessor for exponentially increased memory access. Except for the microprocessor, all these features facilitate ways of using the computer, rather than ways the computer computes.

Engineering workstations and graphics computers commonly contain all these features. In fact, dozens of them are based on the same microprocessor as the Macintosh, the Motorola 68000. These machines cost upwards of \$15,000 — and that's before you buy the software. At less than a third of the

cost, Macintosh resembles one of these machines that has been simplified, stripped down and given a facelift. A lot was lost in the process — just as a lot is lost in modifying, say, a professional movie camera for sale to the public — but a surprising amount came through. You can make acceptable cinematic images

MacPaint is the most seductive Macintosh feature. It provides a professional battery of tools: various brushes, background patterns, geometric shapes and a handy eraser to undo mistakes. Best of all, you pick up these drawing skills quickly — a great confidence builder for computer neophytes.



with Super-8, and you can give a fair imitation of a computer scientist with Macintosh. The Mac's limitations are a relatively small (128K) internal memory and an inability to support multitasking or multiuser operations; its main compromise is the smallish monochrome screen.

What Apple brings to the party is mass production and marketing. Although its retail price is still high, Macintosh is widely available to students at a large discount. Like the IBM PC, Macintosh is for everyone, not just those with \$20,000 to plunk down for a drafting tool. You too can click down a menu and deposit your electronic debris in an iconic trashcan for no more than the cost of a PC.

Engineering workstations are for computer sophisticates. Macintosh is for beginners, and Apple went to some lengths to make it easy to use. You can run the entire system with the mouse, via a remarkable 64K of tightly written assembly code that performs system-management chores. Stored in two read-only memory chips, this code adds 480 special instructions to the basic 56 in the 68000.

A processor's instruction set

consists of the commands the computer is wired to carry out. All commands to the CPU must be cast in a form that will evoke the basic instruction set. The instructions in the ROM chips implement the MAC operating system, the *MacPaint* graphics package, and the special interface instructions that make it possible for third-party software vendors to write for the Mac without worrying about screen management and the mouse.

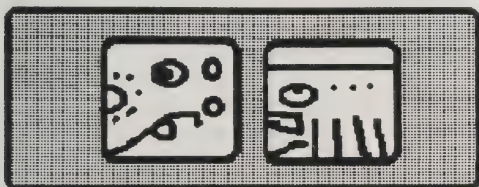
As useful as these ROM chips are, they also isolate the Macintosh from other computers. You will not be able to run Mac software on your IBM PC, or PC software on the Mac. Apple's Lisa is the only other equipment that will run Mac software. Most leading software vendors are impressed with the Macintosh and are working intensively on programs for it; only Microsoft, however, was ready to deliver when Apple was.

In its own price range, the difference between the Macintosh and competitors like the IBM PC lies not so much in what they can do but in how they do it. The Mac is faster and easier. The PC, for instance, accepts typed input. With special software (like Microsoft's *Windows* or

Software of the Gods

Yucatan

650 AD



Conclusive Proof
that the Mayans
Invented the
Macintosh graphics
system eons ago!!!

This is the print-out of the design partly shown on the screen across the page. Jay Kinney, who edits our sister publication, *CoEvolution Quarterly*, kindly lent his considerable cartooning talents to this, his first MacPaint endeavor.

Imagewriter, the companion printer for the Macintosh, reproduces the screen graphics with unusually close fidelity. The \$595 price tag is reasonable, considering Imagewriter's capabilities.

Joy Kinney

VisiCorp's *VisiON*), it can be made to run with a mouse, but slowly and not nearly so usefully. With special hardware it can be turned into a low-end engineering workstation, but then it isn't a PC any more. The Macintosh has a keyboard, but you don't have to use it. And the mouse is wired for speed.

Kids on whom I have tested the Mac have instantly recognized the mouse as another kind of joystick,

more responsive and more accurate than the crude video game accessories. The Mac is an eerie manifestation, in fact, of Ted Nelson's 1979 remark that "the only truly interactive computers are found in game arcades." Nelson, author of *Computer Lib* and an implacable crusader for easy access to computers, saw that the joystick bypassed all the complex syntax that normally slows down the interactive process. Com-

puter makers have taken the hint (perhaps because making computers "interactive" — meaning usable by humans — meant you could sell them to a great many people). They now offer not just the mouse but other devices that move a cursor and thereby access stored data. Xerox has opted for the trackball on the Star, and Hewlett-Packard has gone for a touch-screen on its HP-150 personal computer. The video arcade is moving into the office.

Any of these devices could work with a Macintosh and all of them perform the essential function of giving users direct, hands-on access to the computer. I have been a typist since I was twelve and I'm not afraid of keyboards. But the keyboard's inefficiency is apparent at a glance. The one I'm using now has ninety-odd keys, each of which can

be shifted at least three ways, resulting in more combinations than a Horowitz has to contend with. Yet the display on my IBM PC, like those on most microcomputers, can show me only the 24 × 80 matrix. By contrast, a single Mac I/O device, the mouse (basically a button mounted on a ball), can address a 512 × 342 bitmap. That's an I/O bandwidth improvement of better than 1.2 million to one.

But the mouse was an embarrassment when I was working with *MacWrite*, the Apple-supplied word processor for the Macintosh. Typing with two hands, I needed a third for the mouse. But working with a spreadsheet is another matter. Here the mouse was quick and efficient, selecting boxes from the matrix and changing the display at the click of a button. I had never been able to

THE PETER McWILLIAMS MINORITY REPORT

Let me start with the good stuff. The Macintosh comes with a graphics program that is terrific. This will sell lots of machines to people who will never use it, and it will also sell lots of machines to people who will. It's great fun, and is an excellent example of hardware-software integration. If the Macintosh is a success, much of the credit is due to Bill Atkinson, the author of that program. Architects, designers, and those who make black-and-white drawings regularly are encouraged to look at this program and seriously consider the Macintosh.

From there, the software goes downhill. The included word processing program, *MacWrite*, is mediocre. Okay for memos and homework, but not powerful enough

for business or professional writing. Better word processing will be available, but the Macintosh will not accept a letter-quality printer(!). One must use dot matrix, which is still not acceptable for most business correspondence.

The Macintosh has a nine-inch screen and a single 3½" disk drive. It has a 32-bit processor and comes with 128K of memory. It costs \$2495. A comparably equipped IBM PC (with a twelve-inch screen) retails for \$3135. Given the reputation, software and support the IBM PC has gathered, which computer would you choose for your business? The IBM PCjr (with a 12-inch color screen — Macintosh is only available in black and white) retails for about \$1800. Which

would you choose for your home?

IBM has created the standard for business computers, and has a good chance of doing the same for home computers. The Macintosh has no chance of capturing the business market away from IBM, and it's priced too high for the home.

So who will buy the Macintosh? People who use black and white graphics professionally, some who still think that "technologically advanced" is automatically the best (it's not: compatibility and support are more important these days), a few who hate IBM on principle, and those who are susceptible to the deceptive soft sell.

—From
The McWilliams Letter
(reprinted by permission)

operate a spreadsheet efficiently until I tried Microsoft's *Multiplan* on the Macintosh; with the mouse, I learned to run it easily in a few minutes, and I was able to set up calculations with very little trouble.

Visual strain is a normal hazard of working with a computer. After experiencing the flicker-free, visually quiet Macintosh screen, I didn't want to go back to a commercial video display terminal. The Mac displays 175,104 picture elements (pixels) on a 5 × 7-inch screen, or about 5,000 per square inch. The PC has 128,000 pixels on a 7 × 9-inch screen, or a little more than 2,000 per square inch. The difference is appreciable.

Pricing on the Macintosh has been capricious. Apple originally announced it at \$1,995, then went to \$2,495 at the insistence of new

president John Sculley, who knows Apple can sell all it can make at either price. At the same time, large discounts were offered to students through large university purchases.

Remember that \$2,495 buys you only the box, the keyboard and the mouse. You'll need a printer (\$595) and software. I strongly suspect you'll also need a second disk drive (\$495), because the built-in 3½-inch Sony drive holds only 400K of memory, much of which is taken up by operating software. And you really ought to have a modem (yet another \$495). That puts the price up to \$4,000 without software. At that, though, the Macintosh is competitive with the IBM PC, and it's a lot more powerful. If you can accept the price, you'll see what performance means to the computer pros.

END

IBM PCjr:

The answer to why anyone needs a home computer

by Ken Milburn

I have been interested in the new IBM "entry level" computer since I first heard rumors of its imminent arrival. What a wonderful thing it would be, I thought, if IBM made it affordable for the business user to have a personal computer at home, as well as at the office. Those of us with PCs on our desk tops could do some of our work at home and then take the disks back to the office or transmit the files over the phone.

There would be some tax benefits in purchasing such a machine which would help offset the price. If we could use it to help teach the kids, if we could all play video games on it, and if we could use it for the family files and letters . . . why, it would almost be a three-for-one deal!

At first glance, the PCjr is disappointing. It's tiny: there's obviously no room for expansion cards; there's room for only one disk drive in the system box. The

internal (main) memory can't be expanded beyond a minimal 128K. More professional keyboards are found on machines retailing for \$79.95 (e.g., the Vic 20, available at

better discounters everywhere).

Still, I can't think of another machine that meets so well all four (good) reasons for buying a home computer: (1) "light" business use, (2) entertainment, (3) education, and (4) communications.

I first got my hands on an IBM PCjr a few days before the deadline for this issue. I received a machine with 128K memory, a disk drive, TV-set interface, an internal modem and the parallel-printer interface. Also in the package were "Guide to Operations," and DOS 2.1 and technical reference manuals.

The software consisted of *Crossfire* (a game), *HomeWord* (a word-processor designed for home use), *Monster Math* (an educational game), *Easy Writer 1.1* (which I'm using to write this review), *PFS-File* (a single-file data management system), *Time Manager*, and *Personal Communications Manager* (a communications and electronic mail package).

Since with the PCjr one is using a single disk drive, most programs load into memory, then ask you to replace your program disk with your storage disk.

The keyboard is workable, but slow and slippery. It does have some advantages, though. In fact, if you hunt and peck, you may like it better than a standard keyboard. It's ideal for kids with "nervous" fingers who might type all kinds of extra characters on a keyboard with a faster response time. Obviously, IBM has the educational market in mind. The layout is ideal for keyboard overlays. I imagine some exciting programs will come along to take advantage of this possibility. The first thing that comes to mind is the possibility of a Dvorak template and key programming software. (Does *ProKey* run on the jr?)

The keyboard uses a clever layout to duplicate all the functions of its big brother's keyboard. There is a key called **Fn** that shifts the number keys to corresponding function keys and the arrow keys to the four corner keys of the PC's keypad (**PgUp**, **PgDn**, **Home**, and **End**).

The first program I used with the jr was *Easy Writer 1.1*. I just loaded it up . . . with no configuration routines. *Voilà!* 80 columns on my Sony TV. Warning! If you're used to a monitor, you will find this display quite fuzzy. Still, if you want to see what you're getting in terms of page layout, this isn't a bad way to do things. (There doesn't appear to be any way to configure the program for 40 columns on a TV set.)

Easy Writer 1.1 is a bit clumsy if you're used to more professional packages like *WordStar* or *Easy Writer II*, but it is certainly workable, inexpensive, and easy to use. It has a major drawback in business applications: There is no way to merge data with text. That is, you can't "mailmerge." Furthermore, the program is underpowered in many office systems. It would be wise to use *Easy Writer II* on the office PC. Or find another word processor for the jr . . . one that creates a standard ASCII file that can be read by most other word-processing software.

I tried to run *WordStar* on the PCjr. It seems to work, but on a TV set the screen becomes jumbled and unreadable. Since I don't have an 80-column monitor available to me at the moment, I can't say for sure whether *WordStar* works or not.

Database management is the third important application for personal computers in business. The program in the bundle was



PCjr is a mixed bag — the system unit (on the left, housing the processor and disk) is pleasingly compact, yet touch-typists won't like the keyboard's cube-like keys and spongy feel. Hunt-and-peck typists will have trouble with the characters printed in front, rather than on the keys.

PFS-File. I created a data file with one entry and was unable to print out a readable copy of that entry using the Type command in DOS. Therefore *PFS* files will not be readily transferable to more powerful database programs running on a larger computer.

None of the documentation for the programs supplied by IBM for use with the PCjr mentioned that machine specifically. This lead one to speculate that a good many "standard" PC programs might run on the jr without modification. At the recent Softcon show in New Orleans, I noticed that a number of manufacturers had configured their software for use on the PCjr. Most of these programs were easy to use and worthwhile in terms of function.

I wish I had had the time to try a great many more programs with the PCjr.

No spreadsheet program was supplied. I tried my own copy of *MultiPlan* and it came right up in 40-column mode and worked perfectly. Here is one application you can perform at home with no problem. If you are already a *Lotus 1-2-3* user, however, you won't be

able to run your program on the PCjr, since *1-2-3* requires 256K. However, you could use a file-conversion program to load the *MultiPlan* files into *1-2-3* and go from there.

Time Manager by Microsoft keeps appointments, expenses, bills payable and so on. It can maintain up to nine money accounts (e.g. receivables, payables, expenses, time billing) and report on them daily, monthly or in any time increments up to a year. This program could be a useful one to transport between home and office. It doesn't seem to accommodate appointments easily for more than one person, but it allows you to sort on a keyword. After spending a half-hour on *Time Manager*, I have the feeling I would buy it. I'm tempted to buy a copy for myself, so I won't have to go through receipt files, appointment books, and phone books to restructure expenses or the activity on a given account. The program can be configured to run on either the PC or the jr. It is copy-protected, so if you want to use it on both machines, you may want to buy two copies.

Personal Communications Manager will allow you to send electronic mail, as well as all other types of files, to your office PC. And, of course, your office could use it to send mail to you. Some companies might do well to supply their executives with PCjr's to make instant written communication available for a wide variety of applications.

In summary, the IBM PCjr can be a serious "home" computer in spite of (and to some degree, because of) its well-publicized limitations. Graphics and colors are mightily improved over those

in the PC, making the jr better suited to education and entertainment. Capable business applications software will run on the jr, and the files are compatible with PC DOS versions 2.0 and 2.1.

I would advise buying an inexpensive 80-column monitor to use with the PCjr to make the screen image more readable and running business applications easier and more practical than with a TV monitor. The business capabilities of the PCjr make it a fine machine for running domestic affairs as well.

END

Likeable but Odd

by Louis Jaffe

The PCjr "enhanced" model isn't a toy: in some ways it's quite a likeable system, but overall I find it a rather odd mix of components and capabilities.

It was pleasing to see the PCjr run an unmodified IBM PC version of *WordStar*, even though the program ran not a bit faster than it does on my 8-bit CP/M system. Turning to the *HomeWord* software, I noticed an agonizing lag time between my typing of the

characters and their appearance on the screen. *WordStar* was much better in this regard. I also ran some of the game and graphics programs provided to dealers by IBM. These early products are not impressive; the graphics are simplistic and slow-running.

PC vs. Macintosh

One morning I spent 45 minutes on the jr, then moved over for an equal amount of time on the Mac. As a user schooled in operating systems of the CP/M and MS-DOS ilk, I found myself able to make immediate use of the jr, and back at square one with the Mac.

The PCjr is a plodder, but it has familiarity working for it. The Macintosh is a thoroughbred, but unfamiliar, untrained.

Both these machines look a bit different from other systems. Once you settle down to use them, though, it becomes evident that the Mac really *is* dif-

ferent, through and through, whereas the jr is quite conventional.

If the microcomputer business has established traditions in its scant ten years of existence, then the PCjr is a tame (but comfortingly familiar) continuation of those traditions. The Macintosh

To my eye, the PCjr's screen updating of both text and graphics looks unusually slow for *any* microcomputer. Perhaps new software will prove me wrong, but my guess is that the lag is inherent in the hardware design.

I like the jr's little system unit: it's a nice, unintimidating size. Unfortunately, the IBM standard 12-inch color monitor (though excellent quality) is scaled for a full-size PC, completely dwarfing the jr system unit, and adding half again to the base cost of the system. Happily, the jr can also use standard monitors and TV sets. A 9-inch monochrome monitor sitting atop the system unit would probably be just right for word processing.*

The keyboard really is as bad as people say. To others' gibes at the layout and the lack of labeling on the keys themselves, I can add that the action is downright sticky. You'd think IBM would have noticed that Radio Shack, after enduring years of criticism for the button-type keyboard on its Color Computer, finally replaced it with a conventional keyboard — to the applause of users.

I do like the infrared keyboard link. IBM had a good idea in imagining the keyboard being passed around a classroom so each student

can interact with a stationary system unit.

The PCjr's biggest plus is its reasonably high compatibility with IBM PC software (though not as high as some machines by other makers). Another strength is its ability to load software via either or both of two cartridge slots.

Take away the IBM name and PC compatibility, though, and you have a machine costing \$1300 with 128K RAM, one disk drive, no monitor, and no applications software. The jr has no graphics advantage over an Apple IIe, and for the money you'd get more business processing power with a Kaypro II. The jr has some expandability, but trying to grow the system into a full-scale IBM PC doesn't promise to be practical or economical.

It seems almost as if the PCjr's designers took note of all the major capabilities a micro is supposed to have, and then produced a system that does a mediocre job on each of them. Sophisticated computerists won't want this product. But the jr's tame conventionality is also a strength. With strong software and hardware support, it could probably do well in the home and school markets.

END

*Note: IBM recommends against stacking your monitor on the system unit.

on the other hand is nothing less than a new definition of "microcomputer."

The Mac presents a *tabula rasa* to software developers, which I think perhaps the Apple people have tried a little too hard to fill. The much-vaunted user interface

seems a bit busy. However, I did find that I memorized the icons more quickly than English-language commands, and a little tutoring got me up to speed quickly. The real excitement of the Mac is its potential — orders of magnitude greater than the PCjr — for future

generations of software.

Will we now see a race between jr tortoise and Mac hare? If race there be, my sympathies are with the hare. More likely, the two will take off down different roads to different destinations.

—Louis Jaffe



The Coleco Adam isn't as dainty as the PCjr, but the keyboard is good and the whole package well integrated. Note the high-speed tape unit in front that is Coleco's reasonable, low-cost answer to disk drives.

Writing on the Adam

by Stewart Brand

The sheer convenience of writing on this beautifully integrated system will ensure that the Adam stays out of the closet. Its presence in a room is a constant invitation to write something to somebody.

All it takes to start is: turn on the TV, turn on the printer, hit one button (WP) on the keyboard, and you're word processing. (Setting up the whole system the first time is equally merciful — far the easiest of any on the market.) Beginning the first time with the program is inviting. You start with the familiar — standard typewriting, instant reward. As you foray into word processing, by way of encouragement all keystrokes make a sweet-sounding blip blip on the TV, with different sounds for different actions (backspace delete goes munch munch — these sounds can be diminished or turned off entirely). Immediately you learn to save your writing onto the cassette, a surprisingly rapid operation, and also pull it out of storage via an appealing file directory. The manual is brief, clear, well-

illustrated, and there's a handy reference card.

The many features are readily accessible by tapping the "Smart Keys" labeled I, II, III, IV, V, VI on the keyboard and always showing their current range of functions on the screen. Mistakes are forgivable at any point thanks to the adroit design of the *Undo* and *Escape* keys. Even character deletes can be recovered. Since the printing is an operation that can be walked away from, I don't mind that it's slow and loud compared to other printers. The typewriter quality of the result is so attractive, it's worth it.

For homework, for letters, for reports, this is the home instrument of choice. It's limited only by the size of documents storable (256K per tape) and the size of text movable at once (one screenful max). It's not fancy (there's no

underlining, for example); it's clean. Short of dedicated word processors costing more than \$8000, it's the most thoroughly integrated writing system you can find. Everything fits together neatly.

That was easy. Now for my reward — a quick session with B.C.'s *Quest for Tires*. Unlike our IBMs and Kaypros and other somber machines, the Coleco retains its historic happiness with games, cartridge or cassette, and

there's a nice pair of game controllers in the package, complete with numberpads.

Good design, good price — \$700 for the whole ready-to-go array. A bargain machine for the home. The major competition is the Commodore 64, which does more, costs more, and is more complex to handle. Unless I was launching into serious knowledgeable computer use, I'd start with Adam.

END

Commodore 64: First Disposable Computer?

by John Seward

The Commodore 64 is the Bic lighter of computers. It works great and is more functional than the heavy, silver-plated table models. But it's not destined to become a family heirloom; it looks and feels disposable. K-Mart sells them like lawn chairs — in fact, the salesperson may have been selling lawn chairs last week. But despite all that, or perhaps because of it, this is a revolutionary computer. I've been writing software for the 64 ever since it was introduced, so I'm pretty familiar with its strengths and limitations.

Compare the 64 to an Apple IIe. The 64 has the same standard memory, a slightly augmented version of the same central processing chip, better color graphics capabilities, a complete three-voice sound synthesizer, a better keyboard, a built-in cartridge slot — and it costs about one-fifth as much. Of course, the Apple looks much more substantial. It weighs more and kids will probably treat it with greater respect. And the Apple has a well-deserved reputation for reliability, which the Commodore lacks. Even if your Apple breaks, you can probably take it somewhere and get it fixed; with the 64, if you've gone past

your warranty, you might as well go down to Toys-R-Us and pick up another one.

If you compare the 64 to a PCjr, the 64 has a nicer keyboard, lower price, and will not run IBM PC-compatible software. The 64 isn't compatible with *anything*, including other Commodore computers, and probably never will be. Not that it necessarily matters. There's plenty of cheap, good software available for the Commodore 64, with more coming out every day: games, spreadsheets, word processors, database managers, accounting systems and educational programs.

There are upwards of two



The value you get from the less-than-\$600 Commodore 64 (including the disk drive shown) explains why it's selling in the millions. The 64's keyboard has a surprisingly crisp, comfortable feel. Many of these are bought primarily for games, but a good percentage wind up in professional and business settings.

million 64s out there, and Commodore will most likely sell that many in 1984. Since the logic of the software marketplace dictates that software shall be priced not according to its quality but according to the price of the hardware it runs on, most of the software available for the Commodore 64, even the sophisticated stuff, is cheap.

The Commodore 64 has 64K bytes of RAM (Random Access Memory), hence its name. This determines the size and complexity of programs that will operate within it. If a program is written in BASIC, the language that comes with the 64, there are only about 38K bytes available, because the built-in BASIC interpreter (which is also a program) takes up 26K before any other program is loaded. But 64K, even if it's only 38K, is a lot of memory, room enough to get fancy. [The now-defunct TI 99/4A has 16K; the Commodore Vic-20 comes with 5K; the IBM PCjr comes with 64K (expandable to 128K, which the 64 is not); the Apple IIe comes with 64K, also expandable; the Radio Shack color

computer comes with 16K.]

The Commodore's video and sound-synthesizer chips are products of Commodore's own chip factory and they both have everything but the kitchen sink thrown into them. The video chip allows every imaginable color graphics mode: character, bitmapped, multicolor, high resolution, and all the combinations. There are 16 colors available, with a resolution of 320 X 200 dots. However, many of the colors do not go well together, and it is sometimes difficult to find a combination that works well for a particular application.

The 64 also has a feature called sprite graphics which makes it easy to write BASIC programs that contain many fast-moving, colliding objects. A sprite is a colored shape that can be easily moved around the screen, can detect collisions with other sprites, and even knows whether to go in front of or behind another sprite when their paths cross. As many as eight sprites can be on the screen at once.

The three-voice synthesizer-on-a-chip enables the 64, hooked

up to an ordinary stereo system, to produce rich and diverse sounds and music. The programmer controls three separate voices, each of which has a range of eight octaves. The quality of each voice's sound can be programmed by controlling the attack, decay, sustain and release of each note, along with its frequency.

Of course, when you first pull the Commodore 64 out of its box, it doesn't do any of these magical things. If you're not a programmer, to experience the graphics or sound potential you need programs that turn your computer into an electric artist's canvas or a music synthesizer. Even the BASIC language supplied with the 64 has no commands specifically to manipulate the graphics and sound chips.

If you want to talk to other computers over the phone lines, the Commodore 64 is one of the cheapest ways to go. Commodore sells modems for the 64 starting at well under \$100. The modem plugs into the 64 directly; then you can access databases like CompuServe, talk to your friends' computers — even commit computer crimes that are becoming faddish.

The Commodore 64 is designed to be like a Volkscomputer, and it comes close. But there is still considerable room for improvement. Cost cutting has resulted in a fairly high return rate of defective computers. Of course, if your 64 fails when you get it home, there's no

problem in exchanging it for a new one during the warranty period. And if it lives through the warranty, it'll probably keep working for a long time, if well treated. Solid-state components don't really wear out. They can be defective, or damaged, but otherwise they'll last.

The Commodore 1541 floppy disk drive, a necessity for any serious data manipulation, also has some drawbacks. It is probably the cheapest disk drive on the market and cost cutting is most evident in the drive's mechanical components, which sometimes have alignment problems. Along with this, you unfortunately also get one of the slowest disks on the market. Nevertheless, 1541s are selling like hotcakes and will probably improve with time. Other 64-compatible drives, made by third-party companies and slightly more expensive, are beginning to appear.

The Commodore 64 is a good deal. I recommend it to my friends.

END

Confirming the estimates in this article, we understand that 400,000 Commodore 64s were built in December alone. You won't feel lonely if you buy one. Commodore is coming out with new peripherals for the 64, too, which could be an indication of the machine's longevity. They include a color monitor, new disk drive, "TouchScreen," light pen and speech synthesizer.

—MM

IBM: P.O. Box 2989, Delray Beach, FL 33444; 800/447-4700.

Apple Computer, Inc.: 20525 Mariani Avenue, Cupertino, CA 95014; 800/538-9696.

Commodore Business Machines: 1200 Wilson Drive, West Chester, PA 19380; 215/436-4200.

Coleco Industries, Inc.: 200 Fifth Avenue, Rm. 1234, New York, NY 10010; 212/242-6605.

ENABLING COMPUTERS

There are three reasons why personal computers for disabled people are important. The first is technology. Many useful innovations in computing and communications first appeared as helping devices for handicapped people: voice synthesizers, machines that scan and recognize printed characters, telecommunication protocols (the first, Baudot, was developed so deaf people could use telephones). The telephone itself emerged from Alexander Graham Bell's experiments with amplifying voices for the hearing-impaired. So if you want to know about future mainstream computer tools, such as computers that respond to spoken commands, you could do worse than find out what the disabled are using now.

The second reason is the disabled themselves. According to the American Coalition of Citizens with Disabilities in Washington, D.C., 36 million Americans are physically or mentally handicapped. For them, personal computers can help remove obstacles to self-reliance — so much so that a sub-industry is brewing for the disabled, one with proportionately as much hype, arbitrary pricing, backfiring good intentions, undelivered promises, and genuine value as the larger microcomputer circus. Since this specialized market is small, tools for the disabled are often priced higher than comparable mainstream devices. If you're disabled or close to someone who is, keep a skeptical, informed eye on available tools.

The final reason is the rest of us. On computer networks, for instance, people aren't judged by their physical appearance or physical abilities, but by their insight and their ability to express themselves. Those of us who aren't handicapped, and who may have had little personal contact with disabled people, more often find them in our lives. That's good — keeping them separate diminishes us as individuals and diminishes our culture.

*We asked several disabled writers to comment about devices they use or have tested, and to supply some general guidelines on buying dependable hardware and software. Mark O'Brien, shown on our cover and above right with his Radio Shack Model 100, first wrote for us in *CoEvolution Quarterly* two years ago. Because he had polio at age six, Mark can only move his head, neck, left foot and left knee. He steers himself around Berkeley, California, in a motorized wheelchair controlled by foot pedals and kneepads. Charles Jackson, writing about another lap computer device, is a partially sighted*

Mark O'Brien



Matt Herron

journalist who lives in San Francisco. Susan Jo Russell uses LOGO in several schools in the Boston area to reach children with physical handicaps or learning problems. Her report was adapted from an article in the October 1983 Classroom Computer Learning (\$19.95/yr. from 5615 West Cernak Road, Cicero, IL 60650). Harvey Lauer works for the Veterans Administration in Chicago, putting together affordable computer combinations (mostly with Apple IIs) for blind people and vision-impaired users like himself. Writer Peter McWilliams (The Word Processing Book, etc.) introduced us to Al Mann, who has cerebral palsy and writes regularly about computer technology and disabilities from Poughkeepsie, New York. —Art Kleiner

Mark O'Brien:

The Model 100, judging from its advertising, was designed for frantically busy executives who write desperately urgent memos while being chauffeured to the airport. It accidentally happens to be ideal for disabled people like me.

The Model 100 is about the size of a textbook. My attendants place it in my bookrack and I press the keys with my mouthstick. One-finger typing may sound slow and frustrating, but the Model 100 is the fastest writing system I've ever had, next to dictating. For the first time, I feel my writing can be private. I am free to keep a journal, write personal letters that really are personal, and rewrite as much as I want without having to pay a secretary.

I am a writer and that's the only reason I acquired a computer. The Model 100 displays text on eight 40-character lines. The screen's

brightness can be adjusted, a feature for which I am grateful. The other computer I tried would fry my eyes in an hour.

Corrections are easy to make. Letters, words, and vast blocks of text can be cut, inserted or rearranged. My first try at rearranging a sentence gave me a sense of immense power, a feeling that can best be appreciated by quadriplegics living in a world designed by and for able-bodied people.

I have only two problems with the Model 100. One is that there are occasions when I'd like to punch SHIFT or a command key at the same time I hit another key. This is hard to do with a mouthstick. After the California Department of Rehabilitation bought the Model 100 for me, a friend of mine phoned Tandy in Fort Worth and discovered that the company makes special shift and

command buttons that stay down after being pressed. Anyone who intends to operate a Model 100 with a mouthstick should talk with corporate headquarters about special buttons before making a purchase.

The other thing I dislike is the manual. Although it clearly describes the Model 100's text, address, schedule, and other functions, it becomes perfectly opaque on the subject of programming in BASIC. The Model 100 comes equipped with a numeral pad, but I have yet to learn how to add one and one on it.

Overall, though, the Model 100 is a dream. I want to plug it into my phone so I can use electronic information services. This will make it easier for me to

research articles and satisfy idle curiosity — what did the F. B. in Samuel F. B. Morse stand for? What hath God wrought? Questions like these will no longer torment me.

Next to a power wheelchair, a computer is the most useful gadget a disabled person can own. I like this computer better than my power chair. As I told a friend, "I can go farther in it and I can't fall out."

RADIO SHACK TRS-80 MODEL 100
8K model \$799; 24K model \$999. Expandable to 32K with 8K RAM expansion modules (\$119.95 each). Radio Shack/Tandy Corporation, 1800 One Tandy Center, Fort Worth, TX 76102; 817/390-3700.

Charles Jackson:

My work as a radio producer and occasional print journalist largely consists of writing, research and filing. In computer terms that translates into word processing, data management and communications. But what good are these capabilities if you can't see what's on the computer screen or printed page? As a partially sighted or low-vision person, I found these visual barriers even more daunting with computers than with standard-sized print. While I'm not blind to the point that I need a seeing-eye dog or cane, I am well within all guidelines for being legally blind and have used many alternatives to standard print, including braille, large print, reading machines, pretaped material and magnifiers.

The Viewscan Text System is the first device I have found that enables me simply and quickly to overcome the obstacle of my poor vision. The VTS is a modified Epson HX-20 lap computer attached to a flat-neon high-contrast dot matrix display screen about the same size as the computer. The built-in software allows me to adjust the size of the display characters to suit my visual needs — up to 64 times the size of normal

letters. With the VTS I easily increased my speed, accuracy and productivity, all within a day and a half of the time I first plugged it in and received a few hours of hands-on instruction.

Since I had a radio show deadline and two articles due, I concentrated first on the *Textline* word processing program. For the first time in my life (using either braille or print) I could see what I was writing as I was typing it. Previously I only saw what I was writing if I stopped and held the page an inch or two from my glasses, and then only with an extra magnifier. Now I could make faster corrections and be more creative in the way that anyone can with a word processor: writing, rewriting, changing spelling and grammar, and editing until I had a letter-perfect document I could either print or save.

The VTS comes with five other menu-driven programs, including *Microsoft Basic* and *Calc*. Though I haven't used the VTS telecommunications package, it offers the ability to dial up data base services and other larger computers.

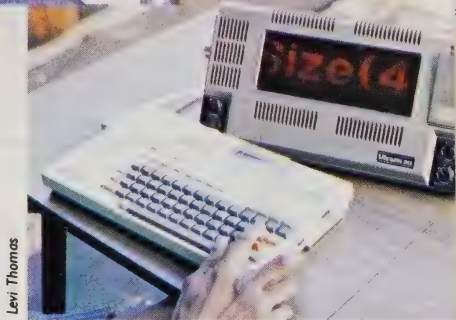
For anyone used to working with a

standard full-page screen display, the VTS may take some getting used to. The screen is a single line display that scrolls past at speeds set by the user. The VTS's memory only holds a few pages of text in itself, but there is a built-in microcassette to store documents in. The built-in printer is useful for writing notes and getting hard-copy printouts in a hurry. This is particularly important for the partially sighted user who has difficulty writing in longhand. The VTS can interface with external printers also, but not as easily as the documentation implies. The Epson HX-20 doesn't have a commonly used parallel printer interface; it uses the RS-232 serial interface, requiring a serial printer (usually more expensive than parallel printers) and a hard-to-find cable called the Epson 715.

Though it's expensive, the VTS gave me all the advantages anyone looks for in a microcomputer, along with the tremendous benefit of bringing print to me for the first time in a size and format that I could see comfortably and naturally.



Charles Jackson uses the VTS system to pursue his journalism career.



Levi Thomas

VIEWSCAN TEXT SYSTEM: \$6280 (component); \$6425 (integrated in hard case). Optional fiber-optic camera that scans print: \$285. Telesensory Systems, Inc., 455 N. Bernardo Ave., Mountain View, CA 94043; 415/960-0920.

Susan Jo Russell:

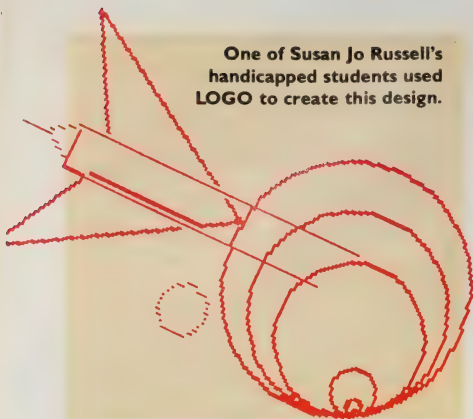
The word "slow," when used to describe children with special needs, is a literal description of how we teachers see them — it takes them longer to get where they are going. That is why the solution at first appears to be to pack more time into the school day. But the child with special needs, like all other children in our classrooms, is an individual who thinks, learns and communicates in an individual way. Instead of more time for learning, we need more worlds — more environments that allow individual styles and paces, that offer engaging content, and that provide new opportunities for teachers to observe and interact with children's thinking. That is where the computer can help us.

During the last two years, I have

been working on a project using the LOGO program with six- to ten-year-olds who are physically handicapped and/or learning disabled. Two facts have impressed me: one, how readily many children, even those who have experienced much failure in school, make LOGO their own; two, how much their work with LOGO tells us about their thinking.

Therese first came to school — a school for physically handicapped children — at age ten. She had a severe hearing loss but had never worn a hearing aid. She used few words, relying on sounds to express her feelings. She had a rare syndrome that resulted in immature growth and necessitated braces on her legs and lower body. She

One of Susan Jo Russell's handicapped students used LOGO to create this design.



looked as if she were five and communicated as if she were two. The school staff knew little about what Therese knew or how she learned.

We began using the turtle robot that functions with LOGO, and a button box (a plastic box with widely spaced buttons used as a keyboard substitute). Therese showed immediate delight at the movement of the turtle on the floor. After a few sessions, she clearly distinguished the functions of the button labeled **F** (for forward) and **T** (for turn). Later we introduced her to the same commands using the computer keyboard and screen in a version of single-key LOGO. She had difficulty coordinating the actions of watching the screen and finding the right key on the keyboard: when she moved her eyes to the screen, she would lose her place on the keys. Despite this difficulty, and despite the barriers to her hearing and speaking, she persevered.

One day Therese outlined a large square on the screen with her finger. Then she outlined something in the bottom center of the square. "Open the door," she said. After making the door, she said, "And a window," and outlined several windows within the square. I imitated her movements: "A window here? A window here?" She pointed again and said, "One, two, three, four, five," showing me five positions for windows. This conversation was the longest and clearest I had ever had with her. It may not sound monumental, but to have shared an experience

with Therese in which she was directing, in which words and ideas were understandable, was rare indeed.

Willie is almost nine years old. He repeated first grade and is now completing second in a public school classroom. His skills in mathematics and reading are well below those expected for his age. When he entered school, Willie cried for hours daily and almost never talked. Now, three years later, he still talks infrequently and often does not answer even when addressed directly. Despite a supportive classroom environment and popularity among his peers, tears come to his eyes when he is confronted by new material.

One of Willie's first LOGO pictures was a car. While he made it he spoke little, but when he was ready to make the wheels, he asked me how to make a circle. It was the first time he had addressed me directly. In his fifth and sixth sessions he made a picture called "the plane in space." For this picture he chose his numbers unerringly, showing a strong sense of proportion and design. His working style was consistent: he worked silently and steadily on his own, asking me questions when he needed a new tool for what he wanted to do.

Willie's language skills are poor, but LOGO provides a world in which he excels. Willie draws as well on paper as on the screen. But what is interesting about his work in LOGO is that he can translate what he knows about shape and proportion into LOGO commands, which require him to estimate, compare, sequence, visualize, plan, and use numbers. He chooses his own problems and solves them, communicating his ideas in a mode that is comfortable for him. Although his schoolwork with two-digit numbers is shaky, in this context he uses them confidently.

For Therese and Willie, LOGO provided compelling motivation in a world that is both structured and open — structured because the children have to work with particular commands that produce particular effects; open because they can implement an unlimited number of ideas with it. Both Therese and Wil-

lie were limited in their spoken and written communication. The context of LOGO encouraged their expression and sharing of ideas. Unlike drawing, for which they could guide the crayon directly, LOGO required them to translate their intentions into a series of commands understood by the turtle. To do that they had to analyze and plan — in effect, to think about their own thoughts.

Therese can now handle only the simplest single-key commands. This is a manageable environment for her, one in which she can direct the action. Willie, who can use most of the regular LOGO

commands, manages a more complex environment. Because LOGO is accessible yet powerful, both these children can gradually expand their knowledge of the tools LOGO offers them. If we do not limit children's access to new worlds because of our expectations about their abilities, then they will show us unexpected strengths.

Apple LOGO: APPLE II, II+, IIe; 64K. \$175. Copy protected? YES. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; 408/973-2222.

Terrapin LOGO: APPLE II, II+, IIe; 64K; one disk drive. \$149.95. Terrapin, Inc., 380 Green St., Cambridge, MA 02139; 617/492-8816.

Harvey Lauer:

For a blind writer or transcriber, the single most useful machine is the Apple II or IIe with both a braille printer and a speech synthesizer. The most useful software to operate these devices is *Braille-Edit*, whose subtitle (*Multi-Media Word Processor*) is an understatement, because it allows you to edit efficiently in braille, either with speech or on the screen. Through the synthesizer the program can "speak" words out loud. It can also produce regular print, standard braille-on-paper (through a braille paper printer), or computer braille (on paperless braille devices such as the VersaBraille). *Braille-Edit* is compatible with spelling checkers and terminal programs. It contains routines for accepting data from any source and sending raw files to a typesetter or another word processor. I prefer it for writing programs.

With *Braille-Edit*, the user can choose regular or braille characters on the screen, and regular or braille keys on the Apple keyboard (the program comes with special keys to put on the Apple). Text typed in braille can be printed out in regular Roman characters. Math and music can be typed directly in braille for

later production of hard copy. Besides the editing commands, there are flexible formatting options, and a global replace feature permits users to write their own translation tables for braille or for improved speech quality.

For a computer-literate person, the documentation is good. New users will struggle as they learn it along with the use of their computers, but *Braille-Edit* publishes their own newsletter, *Raised Dot Computing Newsletter*, which helps answer some questions and covers computing for the blind in general.

Many talking peripherals work with *Braille-Edit* on the Apple, but the best is the Echo II plug-in speech synthesizer board. Most devices require special commands to talk, or they may talk from the keyboard but not from utility programs. The Echo II comes with software that modifies the disk operating system so that no special commands are needed. This software uses 8 kilobytes of memory. The documentation is good and available on audio tape for blind users.

The speech quality is not "cosmetic." Two or three sounds need improvement. The 200 users we know found the

speech fully intelligible after a few hours' practice. It has good volume and plenty of treble, and you can attach external speakers or amplifiers.

The Echo II's speed is a major plus; its fastest speech speed is faster than all but the most costly voice synthesizers. There's a control on the board (but not discussed in the manual) that allows even higher speeds, though a little timbre distortion results. I turn it up and lower the pitch, and it sounds like an elf with a whiskey voice.

The Echo II has three levels of spoken punctuation. You can choose "some," "most" or "all" punctuation. It can spell words out or pronounce them. Text can be spoken as it is typed or after each carriage return. Without moving the cursor, you can ask it to repeat any block, line, word or character on the screen.

When I edit, my left hand handles the *Braille-Edit* cursor controls, I listen to the synthesizer's output, and my right hand is on braille. The braille can be hard copy from a braille printer — with *Braille-Edit* and some tinkering, many daisy-wheel printers can print grade 2 braille at slow speeds — or a brailler, a device that pushes up pins in patterns that you can read as braille, one line at a time. The VersaBraille from Telesensory Systems is the brailler I find most reliable. As I edit, the speech synthesizer catches the spelling typos, and with the braille I catch the misplaced capitals, punctuation, and spacing errors, as well as any errors in finished braille text.

I am on six advisory committees for computer aid clinics in agencies for the blind. I hope more of these clinics materialize; the need and demand are so great. If only special-device manufacturers had listened to us a few years ago. We need their devices for many applications, but I think it would now serve them all right if we could use everything "off the shelf," and to heck with custom-produced devices. Some of us, like me, can do just that — and it is much cheaper — but it takes study and struggle to get it all together. I tell blind

people who are getting a personal computer that they must go through a purgatory of learning and struggle before reaching a heaven of utility and convenience.

BRaille-EDIT: APPLE II, II+ (with language card), IIe; 48K. Manual in inkprint, plus choice of one alternative form: disk, audiotape, or VersaBraille. An interfacing guide for the various pieces of hardware required for Braille-Edit can be obtained from Raised Dot Computing (SASE) \$300 (\$275 if cash or check). Raised Dot Computing, 310 S. 7th St., Lewisburg, PA 17837; 717/523-6739.

VERSABRAILLE: APPLE II, II+, IIe for Braille-Edit (works with other software on other computers). Includes Master Overlay Cassette; I/O cable; two sets of manuals: one in print and one in Braille; external microphone; battery charger; sample material in Braille; head-cleaning tape. Model P2C \$6,750; Model P2D (international model) \$6,995. Telesensory Systems, Inc., 455 N. Bernardo Ave., Mountain View, CA 94043; 415/960-0920.

ECHO II SPEECH SYNTHESIZER: APPLE II family; IBM PC (with fewer features). \$149.95*. Street Electronic Corporation, 1140 Mark Ave., Carpinteria, CA 93013; 805/684-4593.

*(Discount to handicapped: \$99.95 plus \$4 shipping from SENSE-SATIONS Associated Services for the Blind, 919 Walnut Street, Philadelphia, PA 19107.)

RAISED DOT COMPUTING NEWSLETTER: \$18/12 issues (print version); \$20 audio version. One year free to purchaser of Braille-Edit. Raised Dot Computing, 310 S. 7th Street, Lewisburg, PA 17837.

Communication Outlook

Editor: Tamara Redburn. Price: \$12/four issues (\$15 outside U.S.) from: Communication Outlook Artificial Language Library Computer Science Department Michigan State University East Lansing, MI 48824

We haven't seen a really good consumer guide for computer devices for disabled people. (If you've found one, please let us know.) In the meantime, *Communication Outlook* tracks the far-ahead research and keeps a running directory of new devices as they appear.

Al Mann:

PictureWriter allows me to draw pictures with lines, circles, squares, or freehand, and to add color to them. I didn't appreciate it fully until I tried the more highly acclaimed *KoalaPad*. For these cerebral-palsied hands of mine *PictureWriter* allows much more control, which helps when a spasm results in an unwanted movement. Anyone can make marks on paper, but *PictureWriter* is the only tool I have found that allows me to draw pictures that are acceptable to me.

Besides drawing for my own amusement, I use these pictures in my

Al Mann uses *PictureWriter* and *KoalaPad* to generate pictures (like the one on the right) for his computer workshops.

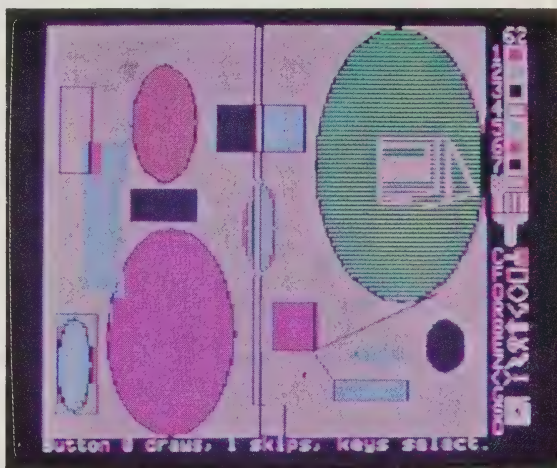
PICTUREWRITER: APPLE II (48K; language card), II+ (64K), IIe, III (emulation mode); color monitor; joystick. \$39.95. Copy protected? NO. Scarborough Systems, 25 N. Broadway, Tarrytown, NY 10591; 904/332-4545.

KOALAPAD: APPLE II, II+, IIe, 48K; disk. \$125. Koala Technologies Corporation, 3100 Patrick Henry Dr., Santa Clara, CA 95050; 408/986-8866.

The journal (published jointly by aid-for-the-disabled research centers at the University of Wisconsin and Michigan State) is refreshingly moderate in its optimism. For instance, it reports diligently on new computer controllers that respond to eyeball or eyebrow movements but takes care to add caveats about slowness and awkwardness: "It is extremely difficult if not impossible to carry on a conversation in the usual sense of the word if the communication rate is limited to 2-8 words per minute. This is especially true if one of the conversational parties is communicating at 180 wpm and the

work. When I teach my workshop in computers, I use *PictureWriter* instead of an overhead projector to show cartoons, jokes and diagrams.

PictureWriter has about every feature (one set of "brushes" and no magnifying) that the *KoalaPad* has, plus three additional features. First, it uses two cursors: one tells me where I am, while the second shows me where I'm going. I can change the distance between the two cursors, thereby controlling my drawing speed. Another feature, Backup, allows me to erase my last step or steps. Finally, Edit lets me review my effort and make modifications. An additional plus on *PictureWriter* is Redraw, which animates the picture.



other is communicating at 2-8 wpm. Interaction can and does take place, but all of the rules of normal conversation are violated, and interactions are generally short, dominated by one party, and highly frustrating." That quote showed up in an article on a new alphabet of symbols, in which one movement, or button-push, can communicate a whole word or phrase (sort of like American Sign Language on a computer). *Communication Outlook's* dense format and academic masthead look forbidding at first, but when you dig in you realize the journal is full of readable, personal experience. —AK END

Writing Tools Update

by Stewart Brand



Some news since the first issue, and some changes of mind — ripening judgments moving toward the ephemeral permanence of the first *Whole Earth Software Catalog*, mustering as we speak.

In Review #1, I made our “first provisional cut” at recommending some word-processing programs. They were: for the IBM PC and compatibles — *WordStar*, *WordPerfect*, *Volkswriter Deluxe*, *Wordvision*, and *Microsoft Word* (with mouse); for CP/M — *NewWord*; for Apple IIe — *Apple Writer IIe*, *Word Juggler*, and *HomeWord*; for Atari — *Atari-Writer*; for Commodore 64 — *Quick Brown Fox*. Other recommendations were the Radio Shack Model 100, the speller *The WORD Plus*, and *Punctuation + Style*.

Since the changes of mind are more embarrassing than the news, let's enjoy those first. The venerable *Quick Brown Fox* (\$49.95) on the Commodore 64 feels old and in the way compared to *Omni-Writer* (\$69.95) from HES or even *Paperclip* (\$89.95) from the Canadians at Batteries Included. *QBF* is on cartridge, the other two on disk. Since cassette storage of text with the Commodore is about as quick as continental drift, you'll want a disk anyway; might as well get a disk program. *Paperclip* strikes me as unnecessarily arcane, so the nod at present is toward *OmniWriter* for more fully-featured word processing, and toward *HomeWord* (\$69.95) or *Cut & Paste* (\$50) for beginners and occasional writers. Fact is, I slighted the Commodore 64 the first time around and shouldn't have. It's a versatile, eco-

nomical, popular machine that still doesn't have a word processor fully worthy of it. More on Commodore, p. 43. If your main use is simple writing and/or games, Col-eco's *Adam* (\$650 complete!) is serious competition for the Commodore. See p. 42 for more on *Adam*.

For CP/M machines such as Kaypro and Morrow, I wanted to recommend *Perfect Writer* (\$349), enhanced with *PluPerfect* (\$32), for heavier duty editing than *NewWord* (\$249) is comfortable with, but we had to leave it out for lack of space. Now corrected. The problem is, almost nobody's writing or even translating new software for CP/M. There are better writing programs appearing for the Apple IIe and IBM PC, and that looks to be the future. Editor Dalton claims someone could do nicely making hot new low-cost writing and graphics programs for CP/M machines, because there are so many of these computers out there. I think he's right, but I bet it doesn't happen. People seem to be looking mainly for the Big Score and the Next Thing. Thrill of the chase, I guess.

Off in its own commercial galaxy the Radio Shack TRS-80 (Models III and IV) was improperly ignored in our initial reviewing. Right now in mid-evaluation it looks like a horserace between *Super-Scripts* (\$199), *NewScript* (\$124.95), and *Lazy Writer* (\$175), with the edge maybe to *NewScript*.

As for the IBM PC and compatibles, reviewer Spezzano wishes to recant about a program he wanted to rename *Porschewriter* . . .

In the last episode of "Whole Earth Software Review Rescues the Masses" I, in the role of excited cub reviewer, enthusiastically recommended *Volkswriter Deluxe* as the messiah of word processors. Three months after submitting an even longer and less rational review than actually appeared in print (thank God for the restraint of editors), I find myself debating between *WordPerfect* or *XyWrite II* (soon to be II+) to replace *Volkswriter Deluxe* as my daily writing tool. I doubt that I am the first reviewer to ever change his mind, but the whole business felt deflating and just plain lousy.


Volkswriter Deluxe is now much closer to living up to Spezzano's original review. Author Camilo Wilson recompiled the program: it's no longer so slow and the destructive backspace works better. First versions of the program were withdrawn and replaced — the story ends happily. Spezzano restates his recommendation this way . . .

If you write occasionally, briefly, and simply, you will delight in *Volkswriter Deluxe's* simple, logical, and easily mastered design. It is a best-buy for families, high school students, college students who don't need footnotes, and business people who don't use their computers primarily for writing. If you write often, make lots of changes, or write long complicated documents (e.g., containing columns, spreadsheets or footnotes), you'll probably want something faster and more full-featured, such as *WordPerfect*.

The major duels in the IBM PC

world for us are between *WordPerfect* (\$495) and *XyWrite II+* (\$295 plus \$5 shipping, nice price) for the top-potency position and between *Volkswriter Deluxe* (\$285) and new contender *Einstein Writer* (\$300) for the mid-range position. We'll be adding the great bargain *PC-Write* (\$10 freeware; \$75 complete), which also runs on the PCjr, and probably also *HomeWord* for beginners.

Macintosh (\$2500). More on p. 31. Hot machine. I think it's a good portion of the future, but at this writing the future still lies ahead for the Mac's use as a word processor. *MacWrite* is lovely — Steven Levy calls it "*Bank Street Writer* for art directors." Great for memos, gaudy notes, newsletters, but its 20-page text limit limits it for much else. *Microsoft Word*, coming imminently, should be distinctly better on the Mac than it is on the IBM PC, though it's still reputed to be a bit clunky. I bet a lot of people in business get the almost-here expanded *Lotus 1-2-3*, called *Symphony*, which includes a decent word processor and telecommunicator, and let it go at that, both on later Macintoshes and present IBMs. I think the 3½" hardshell diskettes are a blessing and I will gladly rally round their becoming a standard. My choice for voluminous writing would be a new *Lisa 2/5* (\$4500) or *Lisa 2/10* (\$5500), which both run the new and forthcoming Mac programs, have considerable memory (512K) and 12-inch (as opposed to 9-inch) screens, and have those addictive hard disks for 5 or 10 megabyte storage. I have to get one. It's my Next Thing.

Apple Writer IIe: \$195, and **Lisa:** Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; (800) 538-9696 • **AtariWriter:** \$99.95: Atari, 1265 Borregas Ave., Sunnyvale, CA 94086; (408) 745-2000 • **Cut & Paste:** Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403; (415) 571-7171 • **Einstein Writer:** Einstein Corp., 11340 W. Olympic Blvd., Los Angeles, CA 90064; (213) 477-4539 • **HomeWord:** Sierra On-Line, Sierra On-Line Bldg., Coarsegold, CA 93614; (209) 683-6858 • **Lazy Writer:** AlphaBit Communications, 13349 Michigan Ave., Dearborn, MI 48126; (313) 581-2896 • **Microsoft Word** (with mouse): \$475: Microsoft Corp., 10700 Northup Way, Bellevue, WA 98004; (206) 828-8088 • **NewScript:** PROSOFT, Box 560, No. Hollywood, CA 91603; (818) 764-3131 • **NewWord:** Rocky Mountain Software, 2150 John Glenn Dr., Suite 100, Concord, CA 94520; (800) 832-2244, in CA (800) 732-2311 • **OmniWriter:** Human Engineered Software, 150 North Hill Dr., Brisbane, CA 94005; (415) 468-4111 • **Paperclip:** Batteries Included, 3303 Harbor Blvd., Suite C-9, Costa Mesa, CA 92626; (714) 979-0920 • **PC-Write:** Quicksoft, 219 First Ave. No., #224, Seattle, WA 98109; (206) 282-0452 • **Perfect Writer:** Perfect Software, 702 Harrison St., Berkeley, 

CA 94710; (415) 527-2626 • **PluPerfect**: PluPerfect Systems, Box 1494, Idyllwild, CA 92349; (714) 659-4432 • **Punctuation + Style**: \$125, and **The WORD Plus**; \$150: Oasis Systems, 7907 Ostrow St., San Diego, CA 92111; (619) 279-5711 • **Quick Brown Fox**: Quick Brown Fox, 536 Broadway, New York, NY 10012; (212) 925-8290 • **SuperScript**: Radio Shack Division, Tandy Corp., 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3700 • **Symphony**: \$695 or Exchange Option: \$200 with return of Lotus 1-2-3; Lotus Development Corp., 161 First St., Cambridge, MA 02142; (617) 492-7870 • **Volkswriter Deluxe**: Lifetree Software, 411 Pacific St., Suite 315, Monterey, CA 93940; (408) 373-4718 • **Word Juggler**: Apple IIe — \$189 and Apple III — \$229: Quark, 2525 W. Evans Ave., Suite 220, Denver, CO 80219; (800) 543-7711 • **WordPerfect**: Satellite Software Intl., 288 W. Center, Orem, UT 84057; (801) 224-8554 • **WordStar**: \$495: MicroPro, 33 San Pedro Ave., San Rafael, CA 94903; (415) 499-1200 • **Wordvision**: \$79.95: Bruce & James, 4500 Tuller Rd., Dublin, OH 43017; (614) 766-0110 • **XyWrite II+**: XyQuest, Box 372, Bedford, MA 01730; (617) 275-4439

ThinkTank

Requires: Apple II, IIe, III; 64K; Videx™ (or compatible) 80-column card (Apple version); IBM PC, XT; 256K; two disk drives; double-density disks.

Price: \$150 (Apple), \$195 (IBM). Copy protected: NO (Apple); YES (IBM).

Living Videotext, Inc., 1000 Elwell Court, Suite 232, Palo Alto, CA 94306; 415/964-6300.

STEWART BRAND: Whether this popular program serves best for writing or for organizing in general is a matter of continuing debate among Whole Earth reviewers. In either case its attraction is that it makes an onerous task — outlining — so easy and so adjustable that you do it, and the first thing you know, you're making sense instead of just rattling on.

ThinkTank's popularity has carried it from its Apple II origins last year, to MS-DOS (IBM PC, etc.), to — perhaps by the time you read this — the Macintosh and new Lisas from Apple, where the mouse and graphics capabilities should double its agility.

PHILIP ELMER-DEWITT: Best use I've found so far: to lay out the stories I write for *Time* magazine. *Time* pieces tend to be highly structured, so it helps to know where you're going with a story before you start. My thoughts, alas, tend to issue forth helter-skelter, bearing little resemblance either to normal human discourse or to the shape of a typical *Time* feature.

So the night before I'm scheduled to write a story, I type my ideas into



ThinkTank as they arise. Then I use the program's outlining features to rearrange them, putting the A's with the A's and the B's with the B's. The key ideas tend to bubble to the highest levels of the outline while the supporting details fall to lower levels.

When I'm done, what I've got is a list of key or topic ideas buttressed with my best quotes and anecdotes. Then I write, using the outline as a guide. Even when I forget to refer to the outline, it seems to shape the story. On occasion I've gone back to look at a *ThinkTank* file I'd forgotten about and found the resemblance between topic ideas and finished *Time* paragraphs uncanny.

Once I used the program to outline a speech. I found I didn't even have to flesh it out on a word processor; simply spoke *ex tempore* from the *ThinkTank* printout.

I don't think I ever got the hang of outlining back in high school. I tended to lose my structure in the flood of illustrative detail. Now that this program has made outlining something of a game, I'm much more likely to do it. Perhaps that's the key.

—New York City, via EIES

- 1: Participatory art
 - 1.1: 20 years ago
 - 1.1.1: Happenings, John Cage; Marshall McLuhan
 - 1.1.2: Whole Earth Catalog
 - 1.2: Now
 - 1.2.1: Antenna, Earth works
 - 1.2.1.1: Vacuum -- audience research
 - 1.2.1.2: High School -- dramatic tour
 - 1.2.1.3: Artery -- guided actor alone
 - 1.2.1.4: Amnesia -- guided actor ensemble
 - 1.2.2: Pornography
- 2: Technology
 - 2.1: 20 years ago
 - 2.1.1: Electronic music
 - 2.1.2: IBM selectric, Polaroid MP 3
 - 2.2: Now
 - 2.2.1: Walkman for Antenna
 - 2.2: Sing along
 - To come
 - Software
 - Gates --
 - Games

Inspired by reviewer DeWitt, I tried drafting a speech with *ThinkTank* on our Apple IIe. He's right; the program not only teases organization out of you, it'll do for notes. (The speech got lots better later, honest.) The numbering system is suppressable if you don't want it displayed. —S.B.

TONY FANNING: I find it extremely useful for organizing my thinking when I have too much to say. The ability to drag one idea through a document to a place where it fits is truly wonderful.

How *ThinkTank* feels when you use it: You start with a blank screen with the word {HOME} at the top. You furiously type one-liners at the screen. These are the basic ideas of the outline you will create, if you have a good sense of the structure of the ideas you're organizing. If you don't, and this is where *TT* really helps, it's just stream-of-consciousness outpouring. I think of this as my brainstorming phase.

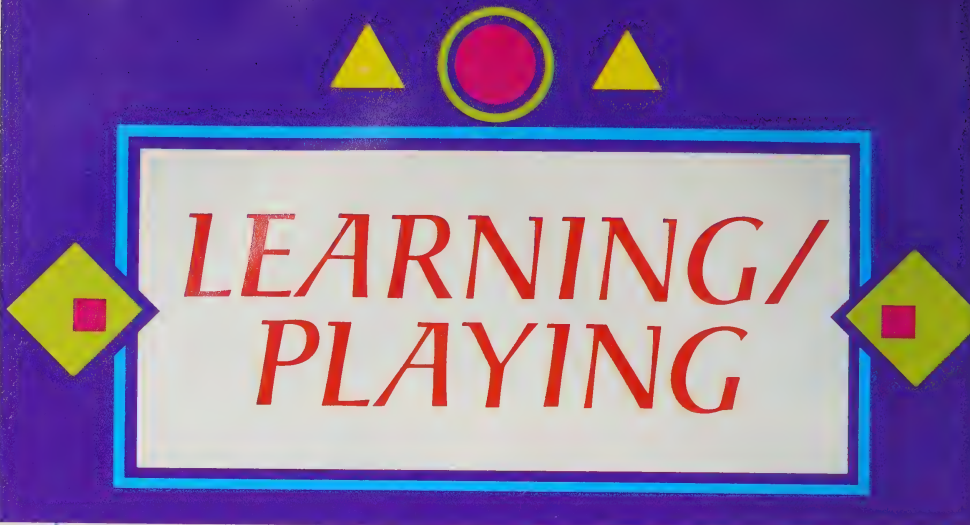
After a while, maybe during the b.s. phase, you notice that some ideas are contained in others, and you simply move them under the main ideas using the cursor motion keys. It's as easy as shuffling little bits of paper but gives you a stronger feeling of a growing structure. Soon you have subordinate ideas, maybe many levels of subordination, neatly indented under other ideas. It begins to look like an outline.

A plus sign precedes every headline (one-liner) with subordinate ideas, and a minus sign marks every headline which is at the end of a chain. On the IBM PC, when you position the bar cursor over one of the plussed headlines and press the minus key, all subordinate material disappears (you can bring it back with a plus). When you do this for all the top-level headlines, you have your topics neatly lined up. Out of order? You can move items simply. If there's something missing at this point, you can add it. Or you can drop down a level and promote what was a subordinate idea to mainhood.

At any point you can enter text as "paragraphs" attached to any headline. In fact, you can import whole files of text from outside your outline. You can move chunks of ideas around, and you do. When you're done you can print out, view or file the outline — to any depth of detail including the entire document with all text. Neat.

Because *ThinkTank* is so visually oriented, words don't do it justice.

—Palo Alto, California, via EIES



LEARNING/ PLAYING

by Robert Scarola

When I was ten my grandfather had a console radio that sat imposingly in his living room. Above it hung a picture of him in an Austrian naval uniform. A lever could change the radio dial: pulling it would superimpose a metal diaphragm arrangement over the channel numbers, providing an entirely new selection of channels. I would stand in front of that radio for hours, changing dial faces and listening to Spanish music, Slavic newscasts, police reports, ship-to-shore transmissions — venturing into strange realities while my grandfather stared down at me from his mysterious past.

That radio was my magic wardrobe, a portal into distant lands. Through it I could control the selection of alternate realities, and in my child's mind, I was as much an adventuring sailor as my grandfather.

That was more than 30 years ago . . . only 30 years ago. In the following decades the world went through the television/transistor/microchip/circuit board revolution and all hell broke loose. Now, both in hole-in-the-wall workshops and in major research studios, grand illusions via computer and video technology are making possible, as never before imagined, the selection, experience and control of alternate realities.

The dangers of this technological revolution are apparent: abuse by charlatans, advertising moguls, clever politicians, Ike's military/industrial complex, irresponsible news media — all the nightmare ingredients of our 1984 witches' brew. But the promise is also there for expanding our human consciousness, for playing and learning in new and wondrous realms perhaps as magical as any behind my grandfather's radio dial.

The following articles and reviews all discuss products that offer a vision, selection or experience of an alternate reality. Some of these products are at the cutting edge of learning simulations and games in which the computer is an active player. Others are designed to make learning specific skills less painful, or even fun.

At the moment, there are very few high-quality learning simulations for adults or for kids. But necessity is the mother of imagination as well as invention and I have no doubt that, even as I write this, somewhere out there in the twilight zone twentieth-century wizards are envisioning new, dynamic grand illusions and translating them into technological realities.

Three Mile Island

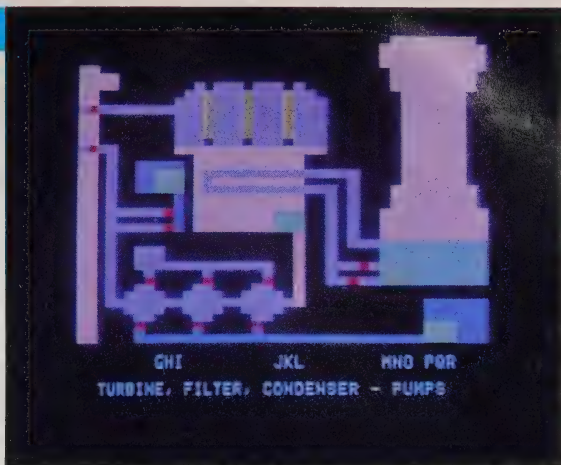
Apple II+, IIe; 48K, 1 disk drive. \$39.95.

Copy protected? YES.

Muse Software, 347 N.

Charles St., Baltimore, MD 21201; 301/659-7212.

THREE MILE ISLAND uses a schematic representation of a pressurized water reactor to put the player in the position of plant manager.



You're the general manager of a nuclear power plant, responsible for overseeing all areas of the facility's operation — power generation, reactor core temperature and performance, financial profit and loss, maintenance, and customer service. You must maintain a profit and you must make sure, at all costs, that you prevent (gasp!) a *melt-down!* Your job is not easy.

All parts and aspects of your system — time, temperature, pressure, electric power production, pumps, valves, turbine, steamer, filters, condensers, containment and core vessels — are in a dynamic relationship. Any change you make influences and modifies another part of the system. The whole thing is alive and operating on the screen. Parts move, warning bells ring, liquids flow and colors change as heat rises or sludge builds up.

It's intense. To observe or modify the system, you get seven views of the reactor facility, listed on a screen menu and accessed by pressing number keys 0-7. The graphics are so good you feel totally immersed in problems that must be solved within minutes. In the containment building you monitor the core vessel, pressurizer and steamer; open and close valves; start and stop pumps that regulate pressure and control cooling. Switch to the turbine, filter and condenser view to monitor the condenser and tower cooling system, flush

sludge build-up and set turbine controls. View and control the reactor, control rods, or pump house; jump to the Maintenance Schedule and Operational Status Report; or get a running cost analysis of the operation.

It's more than just a game. You can learn a lot from *Three Mile Island*: about balancing objectives and controlling dynamic relationships, about how power is produced and how nuclear plants work (useful to know even if you believe they are a curse on the planet), about how you operate in a demanding situation.

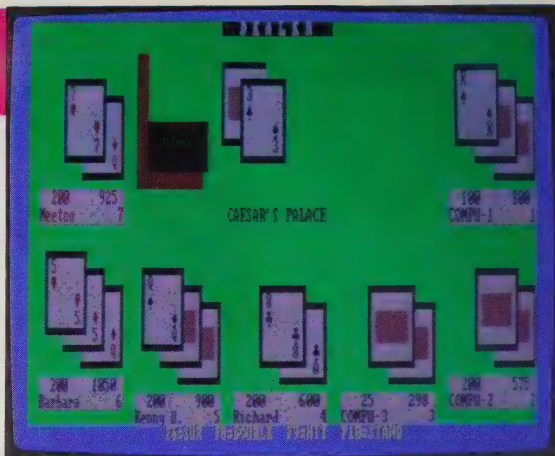
It's easy to imagine you're really in a nuclear plant perched somewhere out there on the edge of a faultline, fingers on the pulse of this most magical and dangerous of our modern wonders. Within the graphically accurate and highly engaging simulation, you can test a real job experience without penalties imposed by the real world for failures or mistakes. It's a game, and you can stop the clock when your sweaty fingers slip off the keyboard. And you can save your state of operations on a back-up disk if disaster is looming or the kids need your attention.

There should be more programs like this one. Wouldn't you like a try at being Queen of England, or maybe a Tibetan guide, or perhaps a parent?

—Robert Scarola

Ken Uston's Professional Blackjack

Apple II+ or IIe, 48K; DOS 3.3; one disk drive. Atari 400, 800, or 1200, 48K; one disk drive. Commodore 64; one 1541 disk drive. IBM PC, 48K; one disk drive; PC DOS and 80-character display. \$69.95. Copy protected? YES. Screenplay, Box 3558, Chapel Hill, NC 27514; 919/493-8596.



Want a quick trip to a Las Vegas casino? How about Tahoe or Atlantic City? In this game, you can pick the town and the casino to play blackjack in. House rules are displayed, you can choose single or multiple decks, and you can seat up to seven players at the table — any number of which can be the computer.

Graphics are clean and crisp. The table top is green; the cards look like cards. Sound is used intelligently — to

tell you when the dealer shuffles; when it's your turn to bet, hit or stand; and even, if you choose, when you've made a strategic error.

You can pick one of four default strategies — basic (you aren't counting points) and Uston's three point counts (simple plus/minus, advanced plus/minus, or advanced point count) — or make up and store one of your own. Don't know how to count points? You can learn. The game contains written explanations,

Sargon III:

Apple II, II+, IIe, 48K; IBM PC, 64K; PCjr; \$49.95. Copy protected? YES. Hayden Software Company, 600 Suffolk Street, Lowell, MA 01853; 800/343-1218 (in MA, call 617/937-0200).

After I got the serpentine monkey off my back and before I got hooked on *Lode Runner*, I spent a couple of weeks compulsively playing chess with *Sargon III*, the latest version of Hayden Software's perennial bestseller.

I used to play a lot of chess with an old college chum. He married and moved to Paris. I inherited his chess books but dropped the game. Until I bought this program. It put me right back into that barbaric place, acting out a collective fantasy left intact from the fourteenth century.

With a twist. *Sargon* lets you open up its head and peek at its systematic

move generator as it tries every possible move at the rate of several dozen per second. Uncanny. Disturbing. Gruesome.

And ultimately it's a real spoiler, 'cause you soon discover that you can get the computer to suggest your best move. If it's better than what you had in mind, it's damned hard to ignore. Let that happen a few times and you find yourself watching a machine play with itself in an orgy of digital masturbation.

Whew.

One other thing: My wife didn't say anything at the time, but while I was hooked on *Sargon*, she seemed to warm up to my Apple — or at least seemed a bit less cool. When I switched to *Lode Runner*, we were back to square one. Apparently the chess game had the same effect on her that a pipe and tweed jacket have on some impressionable coeds.

electronic drills (the goal is to correctly count cards dealt at a speed of one per two seconds) and practice plays. You can set the speed of both drills and play. The computer always counts along with you, and if you choose during the drills or during an actual game, you can pop up a data window to compare its count with yours. The data window even displays a colored bar that tells you whether you should hit, split, double or stand.

Why bother learning how to count points? Well, the obvious reason is to guess which card you'll draw next. But more important, it's to know how much to bet.

Does it work? I played a game on an IBM PC with five players. Three of them were the computer playing each of Uston's three strategies. One was me playing my usual (intuitive) basic strategy. And one was me using Uston's simple plus/minus strategy (with constant prompting from the computer's data window). We played Las Vegas Downtown, single deck, at the Sundance casino. We all started with wallets of 500 and betting units of 20. After a couple hours or so, "basic me" had

1,100, computer playing advanced point had 570, computer playing advanced plus/minus had 1,130, computer playing simple plus/minus had 1,420 and "me playing simple plus/minus" won with 1,480. According to the computer, I guessed right 83 percent of the time. With the computer's help to count points, I had 100% playing accuracy but my betting accuracy was only 74 percent. (That's why I won. The computer has to bet in units, I can press F5 and bet any amount I want.)

You don't have to count points or even pay attention to any of the strategies to enjoy playing this game. It's fun just to guess along. But winning is even more fun.

The game's designed by Ken Uston, a former senior vice-president of the Pacific Stock Exchange, author of several books on winning at blackjack, and a well-known gambler. At a recent Consumer Electronics Show in Las Vegas, where this game was introduced, he was asked to leave five different casinos as soon as they realized who was at the table — but he still won \$3,100.

—Barbara Robertson

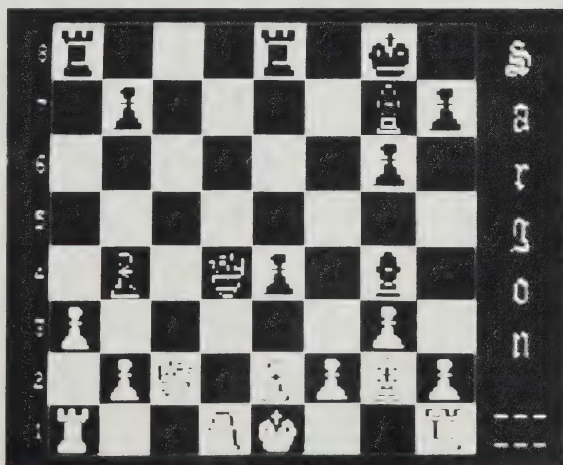
Oh yes, I did manage to beat that dumb computer a couple of times. The program's a sucker for a double pin.

It plays at ten levels, from five

seconds per move to hours. Also includes chess problems and famous games from the past.

—Philip Elmer-DeWitt

Position from the Great Games module of Sargon III. Black's next move is brilliant: 23... Q-d3. (Tatai vs. Karpov, Las Palmas, 1977.) The Apple version shown here has much better graphics than the one for the IBM PC.



The Magic Cash Register

Apple II, II+, IIe, 64K; one disk drive; color monitor recommended but not required. \$34.95. Copy protected? YES. Metacomet Software, P.O. Box 31337, Hartford, CT 06103; 203/223-5911.

The best thing about *The Magic Cash Register* is that it is a magic cash

register. How about that? A software program for young kids that produces what it promises and does it intelligently.

There are lots of good things about this program, and they start right away. When you boot the disk, guess what happens? The screen doesn't hand you a conventional cliché (my God, we've already got computer software clichés!)

Putting Intelligence into Educational Programs

by Daniel Barstow

Before sitting down at the computer to write *The Magic Cash Register*, I did two things: I observed children as they learned about math and money, and I observed myself as I taught them.

We had a play store in a corner of the classroom. Children would take turns buying things and ringing up sales. It was a good way for them to learn about coins and bills and to practice math in a real-world context.

I noticed that the children typically made certain mistakes as they learned. They would become confused about the decimal point and write 35.00 as 3500. Or they would make change correctly, but not with the best combination of coins and bills.

Looking more closely, I noticed some patterns in their calculation errors as they did their addition, subtraction and multiplication. Here's an example:

Correct multiplication:

$$\begin{array}{r} 1.50 \\ \times 3 \\ \hline 4.50 \end{array}$$

Carrying (regrouping) errors:

$$\begin{array}{r} 1.50 \\ \times 3 \\ \hline 3.50 \end{array} \quad \begin{array}{r} 1.50 \\ \times 3 \\ \hline 3.50 \end{array} \quad \begin{array}{r} 1.50 \\ \times 3 \\ \hline 8.10 \end{array}$$

Multiplication facts errors:

$$\begin{array}{r} 1.50 \\ \times 3 \\ \hline 4.60 \end{array}$$

I found that my teaching was more helpful when I was able to figure out what the children did incorrectly. Then I could show them how to do the calculation right, with special emphasis on the steps that they had previously done wrong.

With this experience as a background, I tried to encode my understanding of the human teaching/learning process into a computer program.

To do this, I wrote procedures that model some of the ways in which a human brain thinks. The program imitates a child's brain as it performs typical calculation errors. In other words, the computer calculates a series of wrong answers. If any of them match the child's wrong answer, then the program has found a possible cause of the child's mistake.

In the case of multiplication, the program analyzes for six types of carrying errors. If none of them match, then the computer concludes that the error relates to multiplication facts.

All these technical details are hidden from the user.

The program concludes its diagnosis with a simple message, such as "You have probably made a carrying error. Would you like me to teach you?"

The Wizard on the screen personifies the teacher. The Wizard uses a magic wand to show how to use the cash register, and to point out particular steps in a calculation.

The Wizard can demonstrate how to do any calculation that comes up in the use of the cash register. The intelligence in this part of the program is based on a column-by-column analysis of a child's wrong answer designed to identify the specific steps where errors were made. Again, the technical details are hidden behind a simple message: "Be careful with this step."

These two activities — error analysis and step-by-step demos — can be seen as examples of "artificial intelligence," in that they model human thinking processes. They model the child's brain as it performs various calculations, and model the teacher's brain as it adapts its teaching activities to the particular needs of the child.

I believe that we can put more "intelligence" into educational programs if program authors more carefully observe the human teaching/learning process before sitting down at the keyboard.

like, "How are you?" or "Please type in your name." Instead, it asks, "Isn't your name Barbara?" (or Robert, or Kathy or Matthew, depending on who used the program last). I was captivated by that simple touch. It made me feel like I really was talking to a wizard, someone who had a memory.

It only gets better. Without a lot of fanfare some very clear text explains how the cash register works and what your choices are. In effect, you get to buy and sell, make change and generally participate in an event that *all* of us — nearly everyone over the age of eight in the United States and a lot of the rest of the world — probably does at least once a day: handle money. Now that's worth teaching and learning. And the simulation is fun, friendly and lets you do it without having to worry about making a mistake.

You get to choose what you want

to buy and sell, how much it costs, and how much change you have to give. The cash drawer you work from is nicely imaged on the screen, and the helpful wizard makes sure you know what the coins and bills are in the drawers.

I don't like some programs for children because most kids can learn something much better by just actively doing it. But *The Magic Cash Register* gives continuous, helpful feedback and practice in the art of buying, selling and making change. It's a kind of exposure that a one-time trip to the store or playing with a dummy cash register just couldn't provide.

I can't wait to use this one to teach my fourth grader about money.

(*The Magic Cash Register* is not yet commercially available, though we understand its creator, Dan Barstow, is negotiating at this time for distribution.)

—Robert Scarola

Algebra Arcade

Apple II, II+, IIe, color optional w/color graphics adapter; 48K. IBM PC, 64K. Commodore 64; one disk drive. \$49.95. Copy protected? YES. Wadsworth Electronic Publishing Company (WEPCO), 10 Davis Drive, Belmont, CA 94002; 800/831-6996 (in CA, 415/594-1900).

If you're the kind of person who thinks a sine curve has something to do with highways but always wanted to know what algebra is all about, try *Algebra Arcade*. This is an educational software program that makes it fun to plot algebraic equations on charts.

In this arcade game you wipe out electronic monsters (called Algebroids) on your screen. You do this by suggesting an equation that results in a plotted figure — a curve, a straight line, a wavy line. Your friend, the Whirlwind, whips along the plot you have just created, destroying all the Algebroids in its path. The more Algebroids it kills in one pass, the more points you score.

But, alas, there's a catch. A Ghost takes up a position on the screen. If

your plotted graph touches him, he is transformed into the Graph Gobbler and he eats your graph, leaving him satisfied and you scoreless. As if that weren't bad enough, "The Committee" then determines the penalty it should impose on you — a loss of one, two, or three turns.

You're given ten turns to eliminate the Algebroids with your graphs. If you succeed, the Ghost goes into hiding and you are given three chances to plot a graph that hits his hiding place. Should you succeed, you get more points; should you fail . . . that's right, The Committee penalizes you.

Algebra Arcade is an intriguing way to learn the plotting of different equations. The instruction manual is very clearly written and contains helpful suggestions concerning the use of equations.

This program gives you plenty of options — it allows you to change the X, Y coordinates, for example, or to test particular graphs before you actually play the game. After *Algebra Arcade*, algebra may never be the same again!

—Tom Mach

FACEMAKER

Atari 600 XL, 800, 1200 XL (cartridge); 800, 1200 XL (disk); Commodore 64 (cartridge); Apple II +, IIfx (disk); IBM PC (disk), PCjr (cartridge); Coleco Adam (cartridge). \$34.95 for all versions except Coleco (\$29.95). Copy protected? YES. Spinnaker Software Corp., 215 First Street, Cambridge, MA 02142; 617-868-4700.



Kids like to make faces. They like to draw funny faces. They like to make their own faces turn into rubber masks for the fun of it. They like to put on masks. They like to change the solid, adult world of serious newspaper faces — you know them: lawyers, businessmen, politicians, administrators, soldiers, teachers — into a crayon world they can control and change, usually to make it feel less serious and therefore less threatening.

FACEMAKER by Spinnaker gives the youngest children a chance to do just that — and in the process to learn some commands on the computer, get familiar with the keyboard, achieve some sense of what programming is all about, and in general become comfortable with the neat microworld the computer can offer.

I like **FACEMAKER** because that's all it does. It's clean, simple, and easy — even for preschoolers. It has no commands beyond the ability of the child to understand, and no "game" format to take over the learning value of the program.

To begin, the child presses the 1 key and **FACEMAKER** puts a blank featureless outline of a face on the screen. Then the child uses the space bar to select a feature to paint on the face — eyes, nose, ears, hair, mouth — and, after pressing the return key, selects from a dozen or so comical drawings of the chosen feature. Once the face is built, the child can easily change any feature by repeating the process.

Next, and this is a stroke of brilliance, by pressing the 2 key, the child can write a short program using single-letter commands to animate the face: make the ears wiggle; the eyes wink or cry; the mouth frown, smile, or stick out its tongue (and blat). The child can program all of this to happen in sequence. By using a "—" for a pause, he or she can also give the program a sense of timing. And once done programming, by pressing the 3 key, the child can play a game with the computer in which the face makes several movements or sounds and the child is asked to list the sequence in a program — a good test of memory and early programming comprehension.

Building on children's love of playing with faces, this delightful exercise teaches basic keys on the computer keyboard, gives children some sense of the computer's power to create simulations and representations, and introduces even the youngest children to the concept of step-by-step programming.

There is a playful undercurrent to this program that children like very much. They are put in control of the magic, they are given a range of choices, they can create their own choices — and they can make fun of the adult world while they do it. Hey, the machine is on their side when they use **FACEMAKER!**

Happily, someone at Spinnaker has been spending time with children as well as computers.

—Robert Scarola

INSIDE

*A quarterly compendium of trends, rumors, gossip and guesswork
untainted by the rigors of objective evaluation.*

by Richard Dalton

Those who thought Apple's future revolved exclusively in the Macintosh/Lisa orbit have been disabused of this notion by the announcement of the //c, latest in the long line of Apple // computers. We went to press prior to the official birthdate, but a preview of the //c showed a 7 1/2-pound, highly portable (comes with a built-in handle) machine claimed to be "more than 95%" software-compatible with the //e.

Stated price is "less than \$1,300" for 128KB memory and a single 143KB, 5 1/4" integrated disk drive. The price is a little disappointing but notebook size computer fans may have a winner in this device, as a 24-line, 80-column LCD screen is due out in the fall. This will add only 2 pounds and about \$500 to the basic //c, making it one of the most complete and best performing notebookers in the low price segment of that market.

Apple's president, John Sculley indicated the //c is part of their "Apple // forever" strategy designed to reassure the existing 1,500,000 Apple // owners they won't be left with an obsolete machine. The current //e model will continue to be produced and supported, as well. Apple intends to differentiate itself from IBM for the holy war now underway in personal computerdom by siding with consumers, leaving the Big Business market to the IBM infidels.

Also announced was an innovative \$299 printer that uses a thermal transfer technique

INSIDE

(wax-based ink is heated and applied to regular paper) to print near-letter quality at 50 characters per second or draft quality at 80 cps. Oh, yes -- it will print in full color as well as black.

* * * * *

OTHER HOME COMPUTER FUTURES (or, if you don't have to decide right away, it may be worth your while to wait 6-9 months):

Sinclair, the U.K. micro manufacturer renowned for innovation and super-low cost approaches, has done it again -- this time with a 16-bit computer that sells for £499 (\$725) and includes two microcassette tape drives, 128KB of RAM and software (word processing, graphics, spreadsheet and database; all reported to be good).

Early reports said Sinclair would bring the system, called the Q.L. (for quantum leap), to the U.S. soon, but our British correspondent -- Tony Blake, the Bristol software developer -- says "not likely" as the Q.L. looks sold out for the year based on local orders. Seems a shame as this sounds like an elegant follow-up to Sinclair's dirt-cheap but limited ZX-81 marketed by Timex in the U.S. Tony also said reports of Q.L. manufacturing difficulties are to be discounted. Something about a sensationalist streak in the British computer press.

Amiga, a computer peripherals maker, seems first on the block with a Macintosh knock-off product pre-announcement. Due out "later this year," the system is 68000-based (like Mac) but is touted as cheaper and more usable -- with the ability to run MS-DOS software, like the IBM PC, for example.

INSIDE

We quite correctly praised the Coleco ADAM home computer on page 42, but those enticed by the description should bear in mind that Coleco suffered a \$35 million loss in a recent quarter along with disaffection amongst the investment community. This comes at a time when Coleco is cash-strapped and still having between 10-30% of its ADAMs returned (according to which press reports you believe) for non-performance. A wise shopper realizes you buy a company along with your shiny new computer.

* * * * *

Dataspeed, not exactly a household word, has come up with a device that may point the direction to really portable (pocket size) units. This one is specialized: it's designed to provide instant stock quotes wherever you are. The unit, called Quotrek, is battery powered and requires no telephone connection -- it uses side-band FM or the soon-to-appear cellular radio broadcast networks instead.

Quotrek has an alphabetic keyboard and a limited but usable LCD screen. It costs \$495 plus \$60/month for the stock quotes and any fees added by the exchanges providing the data (\$18.50/month and up). Just the thing for the upwardly mobile stock broker to pull out at the next client lunch.

* * * * *

We were properly chastised for erring in last issue's article on IBM when we indicated that the input/output routines in the PC's ROM were patented. They're not; they are copyrighted -- but the impact is the same.

INSIDE

IBM recently filed legal actions against three of their compatible brethren: Corona, Eagle and the relatively miniscule importer of Asian PC clones, Handwell. All three waved the white flag within a couple of days and agreed to change the offending internal code to escape court actions by the \$40 billion/year giant who counts the U.S. Justice Department among their victories in previous court contests.

Perhaps they were infringing on IBM's copyright; we may never know. At least Eagle has suffered considerably -- they posted a \$9 million loss in their most recent quarter; reportedly caused by a 45 day suspension of product shipments while revising their input/output internals to comply with IBM's demands.

* * * * *

The full-screen liquid crystal displays (LCDs) we predict will be available soon are an intriguing potential. Not only are they lightweight, but they use very little power compared to the cathode ray tubes (CRTs) seen on most desktop computers. And there's more: LCDs don't emit radiation, an ongoing source of concern though no definitive harm is attributable to CRTs so far.

That's not the whole story in flat-panel displays. Expect to see increased commercial use of plasma displays this year coming both from IBM and a joint venture of Burroughs and Telex. Plasma is an upscale alternative to LCDs with better visual qualities and higher prices (at least over the short haul). Finally, Japan's Suwa Seikosha (Epson, Seiko watches and a few dozen other enterprises) is showing a 2-inch COLOR LCD with excellent resolution. The choices get better and better.

BEYOND GAMES



PROBLEM-SOLVING SIMULATIONS

by Ron Rollet

My dedicated colleagues and I at the University of Michigan and KERON Productions, Inc., our software development company, have staked 18 months of research and development and seven figures of costs on one assumption: That people learn the most and retain it the longest by actively finding their own solutions. We can call this process "learning through discovery." It is the amalgam of experimentation, self-exploration, pattern recognition, and even the tedious process of trial and error. Researchers such as Jean Piaget have shown that concrete examples are more effective learning tools than abstract concepts. In the last six years, we have taught "discovery" courses at the University of Michigan that have produced significant increases in student achievement across the entire curricula, from biology to landscape architecture.

Underlying all these comments is the idea that the human mind makes *connections* and that this process follows certain patterns. This idea is contained in French filmmaker Jean-Luc Godard's response when critics attacked his first film, *Breathless*, for not having a traditional structure: "Everything must have a beginning, middle, and end — but not necessarily in that order." This is exactly what we discovered in our research on problem-solving. Generally speaking, a reasonable

Ron Rollet is Chief Executive Officer of KERON Productions, Inc., where he developed the concepts for the SciSoft Discovery Series™. A former professor at the University of Michigan, he is also a noted scholar in the fields of communication, experimental learning, and film and video. The first programs to be released by CBS Software and Holt, Rinehart and Winston under the SciSoft Adventures in Science Series will be on dinosaurs (T.rex) and bees (The Honey Factory).

progression of problem-solving steps occurs. These steps help, but do not guarantee, successful conclusions, and their sequence can change from problem set to problem set. Furthermore, there are rarely, if ever, *single* correct answers. In our educational games for children, then, we choose subject matters and simulations that are as open-ended as possible, allowing players to arrive at a number of different solutions. This helps them understand the complexity of scientific methods and the reasoning behind the resulting principles.

Making computer simulations challenges the software developer simultaneously to use high-level scientific model-building techniques and to creatively transcend the limitations of machine-specific memory, computational, and graphic capabilities. How did we at KERON go about trying to meet this set of challenges?

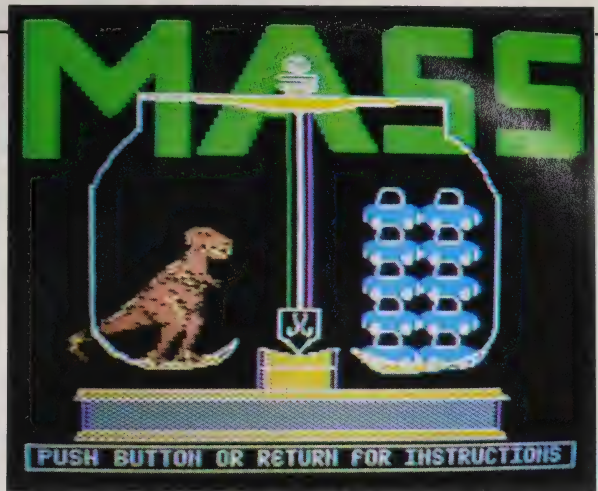
We quickly discovered why high-quality software is practically nonexistent in the science and simulation area: It's very tough to guarantee that the models are accurate and up-to-date in a constantly changing field like natural history. Our data often come from the most recent issues of *Nature*, *Science*, and *Ecology*.

To hold the player's attention long enough for real learning to occur, a program has to compete graphically with the expectations of kids brought up in the sophisticated visual environment of film, television, and arcades. To do this within the limitations of a 6502 processor — now *that* seemed impossible. In addition to hiring a very talented set of programmers, we had to make a breakthrough in graphic presentation. Our solution was to bring in artists *not* trained in computer graphics —

and thus not self-consciously aware of microcomputer limitations. We sought out a head designer with a background in film and theater, used to creating sets and props. These we turned into "objects" filed in a data base library of visual images. The programs would call up these images to "paint" unique habitats for our dinosaur game ranging from those in the Cretaceous period 70 million years ago to the modern African jungle. In addition, we worked with film animators, who would listen patiently to physiologists explaining that large reptiles inclined their enormous masses at specific angles over their bipedal limbs. It is not essential that players understand that the environments of the dinosaur world were checked and rechecked by a physical geographer for accuracy. Nor do they need to know in the bee game that the protein content in the flowering cycle of the bee habitat is based in part on a newly researched doctoral thesis. But for *us* it is critical that we know our science equations to be as state-of-the-art as our ability to scroll 60K worth of graphic backgrounds.

An instructive example of how we approached designing these computer programs was my own informal research on the first topic we chose for our series of simulations: dinosaurs. My office at the university was situated directly across from the Museum of Natural Science, so I used to wander over to the huge hall during my lunch hours. Here gigantic prehistoric creatures were mounted against strange background murals, all of which seemed somewhat frightening to me — frozen frames of a time no child would ever want to visit. I was obviously wrong, because this hall was always the most crowded of all

KERON uses terms like "mass" instead of the more familiar "weight" without apology. It's part of the scientific underpinnings of the organization. Rollet maintains even young children can handle these concepts easily and don't need condescension.



KERON's second program, **THE HONEY FACTORY**, offers four levels to match the skills of neophyte through expert honey producers. Natural hazards (like hungry birds) get increasingly difficult to cope with, too.

the exhibit spaces, and the kids who wandered through it appeared transfixed by a combination of intellectual curiosity and genuine terror. I decided to do a little elemental market research, and asked kids why these monsters so captivated them. Not unexpectedly (being a father and teacher myself), I got a question in return: "Why?" That is, "Why, if these creatures were so big and powerful — bigger and more powerful than the kids' own teachers and parents — did they die and disappear?" And when I told them that

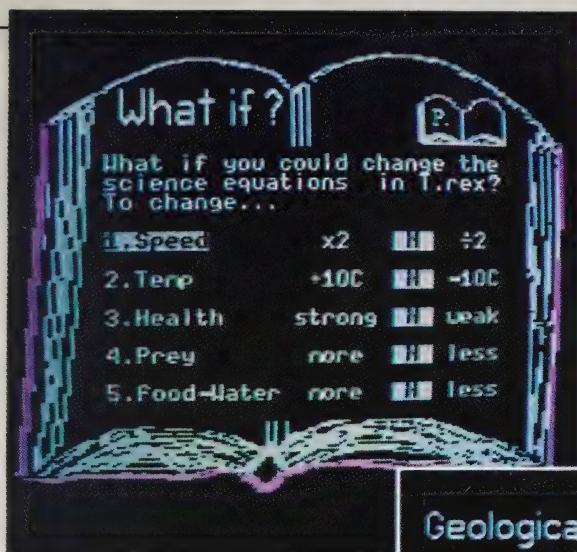
scientists didn't have an answer, that no one knew why they died, I got an unexpected and skeptical response: "How come? If I was a professor and all these offices surrounding the museum were filled with smarty-pants like myself . . . how come we hadn't figured out the answer to such a basic question?" I tried to explain that dinosaurs lived more than 65 million years ago and that humans have only lived for a relatively few years in the history of the world. But that didn't solve their dilemma. They wanted con-



Here's T.rex in his prehistoric home futilely pursuing dinner (he started the attack too far away). Players learn this costs energy without (somewhat obviously) increasing food intake, shown graphically at the bottom of the screen.

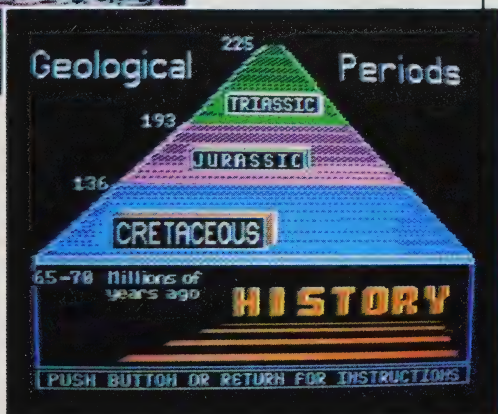


These are two of the elegant habitats you can select for your tyrannosaur. Each one carefully matches scientific knowledge of the varying challenges a dinosaur would face. Scenes roll by as T.rex stomps around searching for food. The aesthetic qualities are unusually well developed.



For those who tire of the standard environment's limits (or just the scientifically curious) you have options that change the program's parameters as shown on the left.

T.rex isn't just a chomp'em-up. You also get a natural history primer for background.



Winning isn't everything — in fact, it's difficult to keep your dino from disaster. That's as it should be, since they aren't with us any more and something did them in.



crete answers to *the* basic question that confronted them, and all of us, every day: *What does it take to survive?* At KERON, we decided that the best way to answer this question was to create a program that simulated in the most accurate way we could (as scientists, educators, and programmers) the world of the dinosaurs and to let the kids play the role of the dinosaur itself.

In the course of playing the game, the player's attention is directed primarily to the role-playing involved in manipulating his or her dinosaur figure. The player moves the dinosaur through various environments, encountering natural obstacles like lakes and defending itself against attack from other dinosaurs. The data base structure is a support for further learning, available whenever the child's natural curiosity is stimulated by occurrences in the game: Why did my dinosaur lose that battle? What else is around me in this new habitat? How fast can my dinosaur run now to catch that anatosaur? What are my chances against this *Triceratops*? What are my current food and water levels? How much food can I eat before I get indigestion and become vulnerable to another predator?

Children who "run" their dinosaur through the game and attack everything in sight will learn quickly that this is an unsuccessful strategy. They will learn to balance water needs and body temperature, food needs and available energy, health status and the nature of the prey/opponent. They will learn to find their optimal environment and, when it is wise, to move to a new one. They will learn about the other dino-

sosaurs that lived around theirs and about their special characteristics. In short, these children will learn what it takes to survive as a dinosaur, and will approach an understanding of their initial question about dinosaurs: Why did they die? They will also learn that what it takes to keep a dinosaur alive is surprisingly similar to what is basically needed to keep other animals — including themselves — alive.

A "help" utility is included that mimics the most useful aspect of simulation: the ability to ask "What If?" and to test choices against the best guesses of the realistic equations that currently drive the program. In our programs the player can change such parameters as ambient temperature, speed of movement, vulnerability to predators, amount of available food and water resources, and so on. This, in the end, is the true test of the educational theory behind SciSoft's programs: The individual learner can speculate with you, the designer, on the elemental rules of the game. Real learning can only happen when real experimentation is encouraged.

One critical question is still to be answered: Is there an audience for innovative educational computer programs designed to improve problem solving through role-playing simulations in natural history? After all, drill-and-practice and didactic show-and-tell programs have sold extremely well to the first round of computer-owning families and schools. We are betting on our instincts and experience that the second round of software buyers will be more demanding and thoughtful. Only time and the marketplace will provide definitive conclusions. END

Trex/The Honey Factory: Apple II 48K, IIe 64K; joystick or keyboard. \$39.95 each. KERON Publications, 55 E. William Street, Ann Arbor, MI 48104.

RAM

Some remarks take on a life of their own in Random Access Memory.

... About two years ago I bought an IBM Personal Computer. This purchase didn't cause me any more anxiety than most of the big ones I had made before.

Buying the software turned out to be an entirely different matter. I felt stupid. There's nothing to look at. I know this should be obvious — what more could there be except the manual and the disks — but it took me by surprise. I had this five thousand dollar computer system, which I had got mainly to write reports, articles and a book. I would go to computer stores on Saturday mornings and look at word processors, the same way I look under the hood of a car when it stalls. Once I see that the engine is still there, I'm lost, but it seems like the thing to do.

—Charles Spezzano

... I would guess that over 95% of the people who drive don't have the faintest idea of what happens when one turns on the key. They just want to go someplace — not take a degree in automotive engineering...

—Frank C. Capozza

... Users don't care about word-length or elegance... unless it gets them home earlier...

—Jack Powers

... Business accounting software entails significant

change for an organization. Not only must individuals learn to interact with the new software, but they must learn new ways of interacting with each other. Frequently, these interactions are substantially more important to success than any specific features of a software product... —James V. McGee

... Most word processors are ridiculous. They remind me of a food blender we used to have — it had twenty-three speeds. Guess how many we used. That's right, two: off and wide open, wishing it would go faster.

—Bill Riedman

... Current "structured editors" that require an author first to specify an outline and then to refine and expand that structure are apt to inhibit rather than stimulate the writing process. What we need instead are tools to help us discover the structure, to accept unconditionally our ideas, notes, brainstormings, tentative structurings — the raw material out of which we will construct a paper, document, or essay...

—John Seely Brown

... End users are going through a tremendous maturation process in terms of using computers. If you don't know what you want to do with a

computer, they're going to be hard to use. They're adequate to use if you know what you want to do...

—Philip D. Estridge
President, IBM Entry
Systems Division

A recent Price Waterhouse survey of 300 Dallas, TX companies concerning micro usage finds that personal computers often sit unused because their potential users lack the training to take advantage of them.

This computer illiteracy continues despite the increasing numbers of people and organizations willing to assist corporations with personal computer education.

—Tom Elder

... The secret to succeeding with computers is to futz with them. Push buttons, move text, insert lines, hit control characters. Try it backwards, sideways and upside down.

The method, if you can call it that, is vaguely scientific — in that you perform some action and observe the results. But the notion of "scientific method" fails to convey the sense of play that should accompany all this meddling. The nature of computing is not solemn, even if the output sometimes is. And a playful attitude will get you further with these machines than weeks of serious endeavor...

—Bart Eisenberg



James Dowlen

Drawing With a Desktop Computer

Imagine illustrating a book or drawing a set of plans for a house using a microcomputer. If your graphic or design work consists of flow charts, schematics, printed circuit boards, mechanical drawings, architectural drawings, illustrations or even freehand sketches, chances are a software package exists for you.

Adding a graphics editor to your personal computer will complement the rest of your software library. In no way will it interfere with your word processor, spreadsheet, database or other applications programs.

Computer-aided drawing (CAD) has become economically feasible on desktop computers only within the last few years as prices of hardware fall within reach of the individual. A minimal CAD hardware configuration consists of a micro with graphics capability, a medium- to high-resolution monitor (preferably color) and a good piece of CAD software. The graphics capability can be packaged with the micro or purchased separately as a graphics board. The price of a graphics capability can run from free (provided with the CPU) to more than \$20,000.

Data may be entered into the computer through the keyboard, but the process is made much easier with a mouse or a digitizing input device. A digitizer is like a small drafting board with an electronic pencil. Prices run from \$250 to more than \$6,000.

To obtain a hard copy of your drawings, you can take a picture of the monitor image or use an output device such as a dot-matrix printer or a pen plotter. Their prices range from \$400 to more than \$20,000.

A good CAD software program will support a wide variety of microcomputers, input devices and output devices. You not only have a choice of quality and price, but you can share your drawings among different brands of micros. Think about it . . . of ten microcomputers owned by people you know, how many different brands are represented? Software prices begin at \$200 and go to more than \$15,000.

These illustrations were created by James Dowlen with Lumena, which he reviews on pages 78-79. The digitizing pen and tablet, opposite, are Lumena's electronic equivalent of the paintbrush.

James Dowlen



CAD software falls into three general categories: painting, 2-D and 3-D. In each category the spectrum of sophistication goes from simple to professional. Generally, the more professional the software, the higher the price and the more costly the hardware to make it perform optimally.

Painting software is often called "pixel-based" software. Simply put, it handles the lighting and unlighting of pixels (points of light) on the computer monitor. The drawing is often limited to the size of the monitor. Again, you can either photograph the created image or dump it as a collection of dots to a dot matrix printer or pen plotter. Painting software is best for freehand sketching, video digitizing, animation and professional graphics work. Typically, a wide range of colors, including hues and shades, is available depending on the sophistication of the hardware (graphics board and monitor).

2-D CAD software is often referred to as "vector-based" software. You can define a circle as a center point and radius, or make a line the connection of two points in a coordinate system, and make highly detailed drawings. For example, a 24 x 36-inch drawing might contain detail smaller than 1/1000 of an inch. The monitor serves as a window to page (zoom and pan) over the surface of the drawing magnifying the image and permitting precise drawing. This software is best used for larger works such as schematics, architectural drawings and posters.

3-D CAD software on microcomputers opens up the world of stick modeling. You can create three-dimensional images as a collection of connected lines and then scale, translate and rotate them to examine different views. You can create orthogonal and perspective views. If the software can remove hidden lines and shade the solid objects, the three-dimensional renderings become more realistic and useful. 3-D software is in its infancy on desktop micros, but will emerge quickly as a powerful modeling tool in the near future.

Several dozen existing CAD software packages have come to our attention recently and more are appearing on the market. In this issue we take a close look at several of these packages as a way of beginning to unfold the potential of "picture processing" with a desktop computer.

—Rik Jadrnicek



James Dowlen

Most graphics systems let you change your palette at will. These two images are identical except for color scheme.

LUMENA

IBM PC/compatibles: 256K, frame buffer; **Mindset:** 256K expansion unit; **MS-DOS,** serial port, color and monochrome monitor, two disk drives. **IBM PC:** \$1250 (4000 colors, 16 simultaneous); \$2500 (16 million colors, 4096 simultaneous). **Mindset:** \$400. **Copy protected?** YES. **Time Arts Inc.,** 3442 Mendocino Ave., Santa Rosa, CA 95401; 707/576-7286.

I first tried my hand at the *Lumena* graphics system with absolutely no computer experience, yet within only two or three hours I had created images using some of the basic functions. In that brief time I was hooked. As a professional illustrator for twelve years, I saw new doors opening for me.

Lumena was never intended as a substitute for drawing ability and design sense, but in the hands of the artist, wonders will happen. The artist encounters little difficulty operating the computer; it is nearly all done with the electric stylus, so the action is essentially the same as with pen or brush. The keyboard is seldom used. Absolutely no programming skills are required. The good people at Time Arts, Inc., created this system with the artist foremost in mind.

As you create with *Lumena*, you make all your decisions by choosing from a menu that first appears at the bottom of your working screen. A mere press with the stylus on the appropriate menu item, and the computer is at work for you.

The simplest way to start is to choose from the pens and brushes of

various sizes on the Pens menu. Drawing with a #1 pen can have the feel of a fine point detail pen; choosing a large brush size can give you the feeling of painting with thick paint (you won't need a smock).

The colors are beautiful, and can be mixed at will, with very subtle adjustments of tone or value. You are dealing with light now, not pigment, so you may need to adjust your thinking while mixing colors. Your primary colors are red, green and blue, not red, yellow and blue. It's really quite different, but you'll catch on; it's not difficult. The luminosity is exciting. It can have the same emotional impact you might get from stained glass lit from behind. I was surprised to find that you can create very rich and natural-looking flesh tones and earth tones, as well as the brilliant hues. In fact, *Lumena* systems offer up to sixteen million colors to choose from. There is a wide price range available.

You can accomplish spectacular color blending of graduated color, or Grad on the menu, creating beautiful effects. Other special computer functions provide you with some rapid techniques you might never attempt by conventional media. For example, you can duplicate (Dupe or Copy) an image exactly, or rotate (Rot) an image — or a portion of an image — to any angle. You can reflect (Refl-X or Refl-Y) an image to get a mirror image. You can change the scale in many ways with the Scale menu, keeping exact proportions or perhaps squeezing the image from side to side while

retaining the original height. A readout will give you the percentage of your scale changes.

One of the more amazing features is the perspective function. If you have ever tried to draw a checkerboard tile floor in proper perspective, you know that even though it is simple perspective, it can be quite a task. With *Lumena* you can lay out the tile pattern flat on the screen (as you would see it looking straight down), then select *Persp.* Choose a horizon line and a vanishing point, and the floor will lie down in perfect perspective.

If at any time you need to be reminded what a function will do, you can read about it by pressing *Doc* in the menu and then pressing the menu title that you are interested in. A readout will come to your rescue and you'll be in the know. This will save you hours of thumbing through the manual.

There are modes for drawing with four-way symmetry, a multicolor air-brush, and lines perfectly horizontal or vertical. *R-band* is a feature that allows you to preview where a line will fall before you commit yourself. You can draw geometric figures — circles with any radius, ellipses of your choice — and you can preview these, too, before you actually draw them.

Filtered line is an ingenious feature that allows a line, circle, or ellipse to look smooth by disguising the stepping of the pixels. A zoom feature on some systems allows you to get really close in to do final cleanup in perfecting an area or working on a tight detail. I love this feature. Some systems also have animation and video digitizing.

Lumena has more features — too many to mention. As you learn the system you will find that most of the effects you are after can be achieved by more than one method, adding flexibility and convenience of operation.

The sophistication of this computer software is amazing, and it is here now! The *Lumena* system brings computer graphics to a new level of professionalism. In my opinion it is sensational.

—James Dowlen



James Dowlen



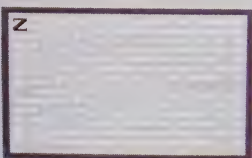
James Dowlen

Above: Several individual images can be merged into one final illustration, changing scale as desired. These are two elements which resulted in our last issue's cover illustration, also seen on page 54 of this issue.

Below: *Lumena* lets you mock up layouts, storing the elements and then mixing them in combinations for various effects.



L LUMENA F. B. W. E. C. S. M. P. G. A. M. P. S. P. C. H. A. S. A. P. T. E. S. S. I. O. N. S.



Dowlen/Time Arts images © 1984



Kathleen O'Neill

The Atari version has the most subtle colors of the Koala family with a menu for choosing 4 out of 16 colors and 16 gradations of light and dark.

on the pad changes you to the drawing screen. Storage and retrieval are very simple and quick, so it's easy to save drawings or to rework ones you've started.

Micro Illustrator (Apple II, II+, IIe) will draw (in several pen shapes) and do points, lines, connected lines, rays, circles, discs, erase, fill, frame, box, magnify (for correcting a pixel at a time) and "help."

Micro Illustrator (Atari) will do all of the basic functions above, plus mirror. It also has a color menu that allows you to mix colors, change colors on your drawing and add a moving rainbow effect on parts of it.

Koala Painter (Commodore 64) has the basic functions plus oops (erases just the last part you did), x-color (changes one color in your drawing to another), copy, mirror, and swap (lets you work on two screens and move parts between the two).

PC Design (IBM) has the basics plus copy, text (adds typed words to images), stamp (leaves a trail of images behind a moving cursor), and bar and pie (makes graphs a snap).

Some programs now use the Koala Pad instead of a joystick, and we're beginning to see new graphic software for it.

I've used the KoalaPad for a couple of illustrations in our other magazine (*CoEvolution Quarterly*), but mostly because it's fun. —Kathleen O'Neill

KoalaPad

Apple II family (48K); Atari 400/800/200/1450 (48K; ROM cartridge); Commodore 64 (64K; ROM cartridge); IBM PC (128K). \$125 (Apple); \$110 (Atari); \$110 (Commodore); \$150 (IBM PC). Copy protected? YES. Koala Technologies Corp., 3100 Patrick Henry Drive, Santa Clara, CA 95050; 408/986-8866; 800/KOA-BEAR.

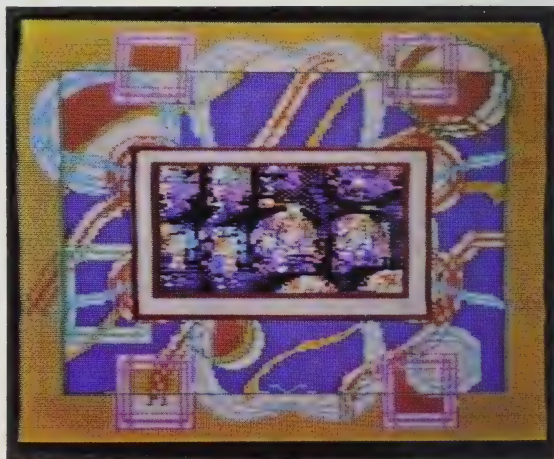
I've been drawing ever since I can remember, and any graphic software that makes me use the keyboard instead of a stylus quickly leaves me frustrated. If you're interested in drawing with your computer and don't want to jump into elaborate additions to your micro, the KoalaPad is an easy, fun place to start.

The pad works with either your finger or a stylus and is surprisingly sensitive and accurate. I find it much quicker and easier to use than a joystick.

The menus are full-screen with both words and pictures, so you don't have to remember any codes. A button

Koala Painter on the Commodore 64 has two screens to work on. I did this as two separate drawings, then brought both of them from the disk to the swap screens. Then I cut out part of the purple sphere and copied them into the center of my other drawing.

—KO



Kathleen O'Neill

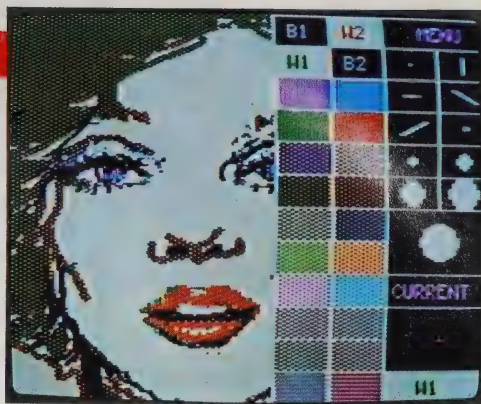
Flying Colors

Apple II+ and IIe. Requires 48K, games controller; a color monitor is preferable. \$39.95. Copy protected? YES. The Computer Colorworks; 3030 Bridgeway, Suite 201, Sausalito, CA 94965; 800/874-1888.

Simply elegant. Or elegantly simple. This is an inexpensive hi-res graphics package that brings a new meaning to the word "nifty." Just boot the disk, punch "F" on the keyboard, and you're off and running. It's that easy. All menu functions are controlled directly by the I/O device (joystick, trac-ball, KoalaPad, or other games controller) in the paddle port, and the entire system can be figured out by a novice in five to ten minutes without consulting the first-rate and quite lucid documentation. This has caused me no end of problems, as between my friends and the neighbor's kids, I can't seem to get anywhere near my Apple anymore.

FLYING COLORS is a fast, interactive program that features eleven brush-tips, sixteen diagonal and crosshatched color patterns, four solid colors, two blacks, two whites (a concession to Apple graphics hardware), circle and box functions, a smart fill-in mode which remembers the last color or pattern used, a point-to-point line function, a freehand drawing mode and a "micro" mode for doing detail work and delicate corrections, all cursor-controlled. And if you feel compelled to deal with the keyboard, there is always the ALPHA function which allows you to type all over your graphic creations and label things to your heart's content.

Saving your creations is as easy as creating them. Slip a blank disk into the drive and direct the cursor over to the INIT box on the menu. The program will ask if you are sure you want to initialize, Y/N. Press Y, then return. The disk is now ready to store up to fourteen pictures. Moving the cursor over to the SAVE function and pressing the #1 button on the controller you will be offered a catalog Y/N, and then an opportunity to name your creation. This is a good idea if you ever want to see it



Marilyn and *Flying Colors*' menu, Apple version.

again. . . . And seeing it again is half the fun.

FLYING COLORS offers a unique display function called the Slide Projector which allows you to stack images much the same way you would in a slide carousel, with a choice of crossfading or successive display. This can be controlled either manually with the games controller or automatically by setting the time function for a period between three and ninety-nine seconds. The pictures, or "slides," can be easily loaded in any order by simple key commands, primarily the arrow and return keys. The "slide tray" will hold sixteen images and can be linked to other "trays" to present a formidable graphic program.

This is a damn good graphics program put out by a new company that excels at such things. You can expect to be seeing a lot more of them.

—Ken Goehner

Boone Spooner (age 5) drew this image of his dog, Rocky, using *Flying Colors*.



4-Point Graphics

IBM-PC, compatibles (192K with PC/DOS, 2.0 or MS DOS, 128K with DOS 1.1); Mindset (196K), 4-Point Graphics +. \$195. Copy protected? NO. IMSI; 633 Fifth Avenue, San Rafael, CA; 415/454-7101

4-Point Graphics has a limited choice of color combinations but excellent pixel-by-pixel control of the image.



Circles, ellipses, straight lines, rectangles — all perfect. Fill them in with color; change to another color instantly. Add text, move it around, turn it upside down. Larger? Smaller? Hit another key. That was easy.

You like what you've done so far but want to try something a little different without messing it up — put it on one of the two buffers: It's there when you want it, you don't have to go to the disk, using the buffer is faster and easier than using the disk and it lets you combine separately drawn images.

The program's not perfect. It's hard to use the keyboard to draw free-form shapes. You can make curves by locating three points, but putting them together

to draw something specific takes a lot of work. Also, the colors are very limited and brash.

I like being able to create my own brush. By using different colors for the brush you can literally draw with a rainbow. Overlapping colors by addition or subtraction creates some pretty wild patterns and textures. There's also a demo mode that records every step you make, so you can animate your drawings.

It's fairly easy to learn the meaning of the keys. C creates a circle, W washes a color into a shape, E enlarges, R reduces, I inverts, etc. But best of all the documentation is really good. It's rare to find operating instruction this clear, logical and well designed.

—Kathleen O'Neill



Nautical themes with 4-Point Graphics. Concentric ellipses, enlarged and duplicated, made the ripples in the fishpond.



BPS Graphics

IBM PC, PC/XT; TI Professional; MS-DOS or PC DOS 1.1 or 2.0; 128K; two disk drives. Also available from Wang as Wang PC Business Graphics. \$350.00. Copy protected? YES. Business & Professional Software, Inc., 143 Binney Street, Cambridge, MA 02142, (617) 491-3377

How high can I soar in praising this fantastic business graphics package? You want pie charts — this program will draw you pie charts like you have never seen. Bar graphs? Your bar graphs will sing. Projections never looked crisper, with lines, curves, and smooth moving averages.

While I could not sit down and make it draw for me without using the manual, for the most part I found the program's documentation clear and logically organized. The only muddly writing was in the first section, on how to prepare a disk and boot the program up the first time. Since you only have to do that once, it was almost excusable.

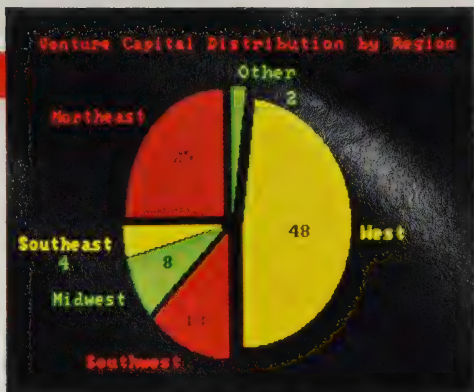
I came to the program cold, with one day in which to prepare 15 slides for a presentation. I selected *BPS Business Graphics* at random off the graphics shelf at the *Whole Earth Software Review*. What luck! Within 20 minutes, I was doing colorful, professional-looking graphics. Unlike several cruder packages I glanced at, *BPS* prepares presentation-quality graphics with no extraneous junk showing. This means that, if you are shooting your slides off the screen, no effort is required to remove unwanted garbage.

BPS has two alternating screens. One is full of data and instructions on what kind of chart to draw. The other is the drawing itself. Before processing a request that would wipe out either data or a graph, the machine double-checks to make sure that is the desired action.

This program's best feature is ease of use. Most graphics packages are so flexible they are useless. That is, before they will draw anything, the user must make 20 decisions.

BPS is different. There are default values for everything. These are easily changed, but if you are in a hurry, you

Paul Schindler



give the program data and it gives you graphics. The program has interfaces for a number of printers and plotters. They are smart interfaces; output on an Epson printer with *Graftrax* goes much more quickly than with some other programs.

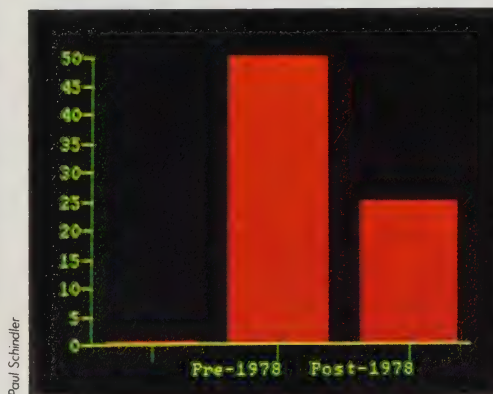
Nothing is perfect, however. The editor, which is supposed to make it easy to change a piece of data or a heading, is balky and difficult to use.

One other aspect of this program deserves praise: the positioning of titles and legends. I have used a number of programs, even on mainframes, in which you get to put titles where the author thought you would want them. Period. Here, you get any number of titles, any color, anywhere you want them. It is the best title-handling routine I have ever seen.

Of course, *BPS* can accept data from other programs as input. In fact, I think it might take your dog for a walk at night.

—Paul Schindler

Presentation-quality graphics for *BPS*: pie chart and bar graph.



Paul Schindler

AutoCAD

Version 1.4. CP/M 80 or 86, MS-DOS; 256K (varies with computer). \$1000 base/\$1500 advanced. Copy protected? NO. Autodesk, Inc., 150 Shoreline Hwy, Bldg. B., Mill Valley, CA 94941; 415/331-0356.

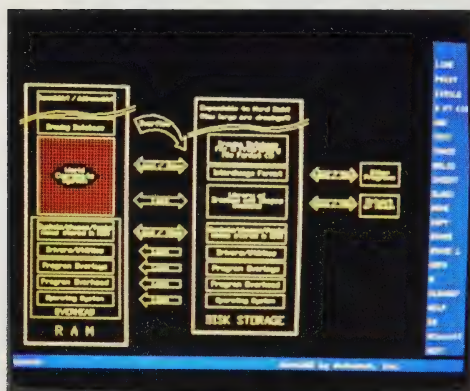
AutoCAD is a two-dimensional computer-aided design (CAD) program capable of graphics ranging from simple flow charts to large and complex architectural drawings. Your microcomputer becomes a drafting table with pencil, paper, T-square, compass and more.

For example, with AutoCAD you can simulate 127 layers of perfectly registered 24 x 36 inch tracing paper, and you can draw on each piece to precise accuracy of less than one-trillionth of an inch (floating-point math).

The hardware needed to run AutoCAD consists of a desktop microcomputer with graphics capability and, optionally, an input device (digitizer or mouse) and hard-copy output device (printer or plotter). AutoCAD runs on a variety of microcomputers including the IBM PC/XT, PC lookalikes, Zenith Z100, Victor 9000, TI Professional, NEC APC, DEC Rainbow and even properly configured Z-80 systems.

All data and commands can be entered from the keyboard but the process can be made much faster and easier with one of a variety of input devices

CAD representation of CAD package by AutoCad.



supported by the program. For example, Opto-Mouse, Mouse Systems mouse, Microsoft mouse or digitizers (drawing pads) of varied sizes manufactured by Houston Instrument, Hitachi, GTCO or Summagraphics are all supported.

A full range of pen plotters is supported including the Hewlett-Packard and Houston Instrument lines. With these, AutoCAD can generate multicolored plots in a range of sizes from letter to architectural.

Primitive commands enable various constructions of lines, arcs and circles used for precision drawing. Editing features include erasing, moving, copying, scaling, and rotating of drawing elements. The \$1500 advanced version provides "Advanced Drafting Extensions (ADE)" which include semi-automatic dimensioning, cross-hatching, partial delete, filleting (a technique which rounds the corners of rectangles), and a free-hand sketch mode with its own set of editing commands.

By means of user-definable menus, macros, and command files, the operator can customize the program with no knowledge of programming (a very powerful feature). The user can also develop and access libraries of shapes by picking items on an on-screen menu or by touching pictures on the digitizer surface and then placing them in the drawing.

Zooming and panning capabilities turn the monitor into a window scrolling over the surface of a large drawing. Zooming into a small area enlarges that area and permits detailed drawing.

AutoCAD is capable of meeting a wide variety of professional drawing needs. In the way a word processor handles text, AutoCAD is a picture processor. It even pages drawings to disk as available RAM fills up, like a good word processor. Since the program becomes slower as the drawing grows larger, an 8087 numerical coprocessor is recommended to speed things up. If you plan to do extensive work with the program, a hard disk drive is recommended to speed up disk I/O.

— Rik Jadrnicek

Advanced Space Graphics

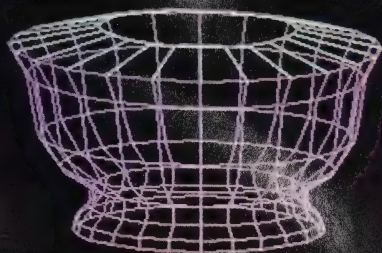
IBM PC (DOS 1.1; 128K), PC/XT (DOS 2.1; 192K), compatibles. \$1695 including MCS 4-axis 3-D Space Tablet Digitizer; \$1995 with package above and MCS HighRES A/D interface card. Copy protected? NO. Micro Control Systems, Inc., 27 Hartford Turnpike, Vernon, CT 06066; 203/647-0220.

Advanced Space Graphics permits you to draw and measure in three dimensions on your IBM PC. Included with the software is a 3-D hardware input device (digitizer). This is both a two- and three-dimensional Computer-aided Design software package for the IBM PC. It lets you measure distances and build stick models in three dimensions. You can then plot a precision representation of your work on a variety of output devices, including dot matrix printers and pen plotters.

For example, you may want to place a bowl on the digitizer and enter its shape into the computer. This is done by digitizing points on the surface of the bowl that become points on the circumference of circles whose centers fall on an axis of symmetry (see photo). A user-specified number of data points on the circumferences of these circles are then automatically connected to corresponding points on adjacent circles. The result is a "stick" representation of the surface. Freehand lines can also be entered separately in three dimensions.

Once the surface is defined, you can examine a top, side and front view of the object simultaneously on the monitor. You can expand and shrink both the X and Y axis scales to manipulate the object. You can rotate and move the shape and even look at it from different perspectives. A zoom command permits you to enlarge parts of the shape for more detailed drawing. Distances from point to point can be calculated automatically with floating-point accuracy.

Distances within the shape you create can be dimensioned, with distance values automatically increasing and decreasing as you rescale the drawing. You can calculate X, Y, or Z distances from



18854 MAIN Action ? ■ 6EXIT
IT-FORM 2FILES 3INPUT 4PRINT 5LARGE



Advanced Space Graphics produces three-dimensional representations of objects, real or imagined. Below, a stylus traces the shape of the object while the screen shows what the computer has seen so far.

point to point or an "as the crow flies" shortest distance between two points. You can also place text labels within the drawing.

A program of this type is used primarily for accurate distance calculation and shape modeling. More advanced systems permit you to shade the stick surfaces once generated and remove hidden lines (lines falling behind other lines). The shape then becomes more realistic.

Advanced Space Graphics does not have the 2-D power and editing flexibility of a well-designed 2-D software package, but it certainly is a sign of things to come. MCS plans a rewrite of the program in spring of 1984 to change from *Advanced BASIC* to the more powerful and flexible language C. More surprises in the area of 3-D digitizing are also in the works. MCS supplies the only 3-D digitizer I know of, a novel idea.

— Rik Jadrnicek



Electronic Notebooks

by Richard Dalton photos by Don Ryan

Sales of notebook-size computers are growing faster than those of desktop models for a simple reason; they allow you to take your personal computing resource along with you conveniently. The cliché is the busy executive pounding away on a notebook computer in the backseat of taxi between business appointments.

The truth is a little more prosaic — you're more likely to take your Radio Shack 100 down the hall to a meeting or use it to catch up with electronic mail at home. Both uses are important and represent a big improvement over fixed-location computing.

People don't just work within a neatly delimited office space. I'm writing at home on a Kaypro II, for example. But I'm a bad example. I have two Kaypros: one in my office and one at home. The Kaypro (and Compaq, Osborne, new IBM and other suitcase-size "portables" weighing 23–32 pounds) turn out to be too heavy to lug between home and office regularly — not to mention down an endless airport concourse.

The notebook computer typically weighs around ten pounds and fits into a standard briefcase. The choice between it and the portable is like the choice music fans have between a Sony Walkman and a hold-to-your-ear-while-building-your-bicep "ghetto blaster" stereo.

Because they are, by nature, go-anywhere devices, most notebook computers communicate easily and many offer battery power, so you aren't limited to using your computer within cord length of a wall outlet. All contain built-in software that adds greatly to their value, since the software is tailored to mitigate the particular limitations of each unit — the result of design compromises needed to cram computing power into a small space.

OUR RECOMMENDATIONS:

- *The Radio Shack TRS 80 Model 100 — at \$800–1000 (depending on memory), a computer usable by almost anyone but especially those who write and telecommunicate a lot. We offer a comparison with the NEC PC-8201, made by the same Asian manufacturer and similarly priced, but with fewer features and a more limited network of service locations — an important consideration when porting a system about.*
- *Convergent Technologies WorkSlate — a specialized notebooker designed for the numbers people. It packs an efficient, portable*

spreadsheets capability into a system about the same size and cost as the *Model 100*. A tape unit, usable for dictation, is a standard feature. *WorkSlate* is the most compact unit we tested.

- The *Teleram 3100* — more expensive (\$1595) than the *Model 100* but if you must store large amounts of data, more useful owing to its built-in "bubble" memory, which holds as much as 100 pages of text.

- *Gavilan* — an elegant, pricey unit for the do-everything portable user. The software integrates well with the hardware and the unique touchpad makes operation particularly easy. It has the largest screen currently available in a production unit.

- *GRiD Compass* — the top of the line in notebook computers. Its price makes it out of the question for most of us, but if performance is the issue, you can tell your friends you have the same computer used by space shuttle pilots to track their position. This is a powerful device, able to compete with almost any desktop personal computer. Good software as well.

A WARNING: Notebook computers are on the leading edge, incorporating the newest in display engineering, power systems, data-storage techniques and other rapidly developing technologies. The risk that you might buy a system that will be superseded by other machines with even better price/performance characteristics is higher than with desktop computers.

We can predict that full-screen (25 line × 80 character) liquid crystal displays will be with us before the end of the year. Some observers expect these as early as this summer in production models of notebook computers.

Should you wait for a better deal? Not if a portable system would make a real difference to you right now. You might, however, consider one of the lower-cost machines, so you could trade up more comfortably if a new computer with more utility appears soon after your purchase.

A note on the following evaluations:

There are many small computers — some are more compact than the ones we recommend; others are "portable" only if you have experience as a baggage handler.

We were looking for computers that were small but still usable for a reasonably broad range of tasks. Our specific selection criteria were these:

1. A display of at least 320 characters (4 × 80; 8 × 40 are the common configurations). Anything less is painful to work with.
2. A typewriter-like keyboard (*WorkSlate* came dangerously close to missing out with respect to this feature).
3. A usable amount of built-in storage of some type that allowed the internal accumulation of data or text.
4. A weight of less than 15 pounds with a product design that allows the unit to fit into a standard briefcase.

All the recommended machines are designed to telecommunicate and include substantial software, integrated with the characteristics and limitations of the specific systems. A broad range of prices and capabilities is represented in each machine standing for (as the British say) "good value."

NEC PC-8201/TRS-80 Model 100 Comparison

NEC PC-8201: \$799; 16K RAM/32K ROM. 8K chips \$120 each (capacity to 64K). 32K plug-in memory cartridge \$395. 14 programs available on cassette. NEC Home Electronics, 1401 W. Estes Ave., Elk Grove Village, IL 60007; 312/228-5900.

TRS-80 Model 100: \$799 (8K model); \$999 (24K model). 8K RAM expansion modules \$119.95 each (capacity to 32K).

Radio Shack Acoustic Coupler (no. 26-3805): \$39.95. Radio Shack Modem Cable (no. 26-1410): \$19.95. Radio Shack Division, Tandy Corporation, 1800 One Tandy Center, Fort Worth, TX 76102; 817/390-3700.

Many people, especially in business, can benefit from a truly portable computer that will fit entirely within a briefcase and leave room for something else. Reasonable criteria include product reliability, vendor stability, a standard size Selectric-layout keyboard, word processor, easy transfer of files to larger computers and battery power. Other desirable features are a built-in modem, calendar and spreadsheet software, plus means of adding packaged programs and storing data or programs quickly. Two products meet most of these specifications — the NEC PC-8201 and the Radio Shack Model 100. The NEC PC-8201 has many fine points. You can expand the memory to 64K bytes internally, and you can also get a 32K plug-in memory cartridge. The cursor-control keys are in a natural layout, and rechargeable batteries are available. The NEC comes with mailing list and scheduling programs, supplied on cassette tape. Connectors are available for (as yet unavailable) accessories.

One peculiar disadvantage is the NEC's keyboard, which is not Selectric standard. That is, the shift characters above the numerals and the colon and quotes are placed differently than on most modern keyboards. The keyboard has no BREAK key, which is sometimes a problem when using the computer as a terminal. Also, when you transfer files to another computer, you must enter carriage returns every 255 characters or less. (I find it convenient to do this when proofreading my text.)

The Radio Shack 100 has distinct



Radio Shack TRS-80 Model 100.

advantages over the NEC. The most obvious is the built-in 300-baud autodial modem, which can be used as a phone dialer without the modem, if desired. The file upload (the function that transfers files to another computer) automatically adds carriage returns as needed. The LABEL key turns on the labels of the special function keys on the screen. The PRINT key is also convenient: press it and the file you're working on is sent to the printer.

A disadvantage of the Model 100 is the somewhat awkward layout of the cursor-control keys; also, the unit cannot run on rechargeable batteries, so it must be operated with disposable batteries or an AC power adapter. The memory, however, is kept alive by an internal nickel-cadmium battery that recharges when the computer is turned on.

Prices of the two units are comparable. Both units are useful as text processors; 32K bytes of RAM will hold about 20 pages of single-spaced text — plenty of work for overnight or a short trip. For longer trips, Radio Shack's built-in modem allows you to transfer files to a computer with greater storage. NEC offers the greater memory-storage capacity. Built-in and available software is very similar.

Considering the most likely uses for a briefcase portable computer, the Radio Shack Model 100 is the superior machine. It has a better keyboard for typing (despite the arrangement of the cursor keys), more powerful BASIC commands, a built-in autodialing modem, and better documentation. The NEC would be my choice, however, if I had a specific application that required its larger memory capacity coupled with battery operation. —James R. Ludden

Telecommunicating with the Radio Shack 100

Harry Newton, who writes for *Teleconnect Magazine*, suggests the following tips on getting maximum benefit when you use a Model 100 or NEC for telecommunications:

Buy two power cords, one for home and one for the office. Always keep the computer plugged in. That way, the rechargeable battery that keeps your data in volatile memory will stay charged and you won't

lose your data.

Buy a two-foot "null modem cable" (a cable with two wires crossed that allows you to send text from one computer to another as if there were two modems and a phone line in between them). Then for back-up, you can send your Model 100 files to your desktop personal computer using its file-transfer program.

With the Model 100, buy a Radio Shack Modem

Cable (No. 26-1410). That will give you a direct connection to the telephone network through any standard modular phone jack. Cost: \$20.

Buy a Radio Shack Acoustic Coupler (No. 26-3805). That will give you a connection at 300 baud via phones that don't have modular plugs like coin phones or hotel phones. Cost: \$40.

—Art Kleiner

WorkSlate



\$1195 (16K RAM). MicroPrinter \$300. CommPort \$300. Convergent Technologies, 2441 Mission College Boulevard, Santa Clara, CA 95050; 408/980-9222.

I fell in love with my WorkSlate. Here was what I had always wanted: a self-contained portable "calc" machine that fits in my briefcase, allows me to work on planes, and lets me show clients how interactive computing using calc programs can help them solve their day-to-day problems and save them time and money.

WorkSlate is a fantastic machine for what it does. It also has some limitations that make it less than perfect. The good things first.

In addition to being a permanent calc machine, WorkSlate has a number of interesting functions. Hook it up to a phone line and you have a speaker phone. Tired of dialing your phone? Keep your numbers in a phone list and have WorkSlate dial them for you. Subscribe to *The Source* or *CIS*? The built-in modem allows easy access. What, you can't remember all those codes, numbers, passwords, and special commands? Look them up once, enter them into the WorkSlate, and let the machine do all the work. Need to dictate on the road? The built-in microcassette recorder will act as your dictaphone as well as store your templates. Create templates but can't remember what they were for when you next look at them? While you're saving your template, you can also record a voice message to be played when you next load it. Forget your calculator? WorkSlate has a special mode which acts just like it (assuming you know reverse Polish notation). Don't remember what you were going to do today, tomorrow, or yesterday? There's a special time-management book built in as a template. Need to wake up? Use the built-in alarm.

Need to see your results printed? There are two options. First, Convergent Technologies makes a portable battery-operated pen printer: it uses four colors

with either compressed or normal type, works from roll paper, and prints either horizontally or vertically. Or you can purchase a communications port and talk directly to any printer using parallel or serial outputs.

The key question to ask about a multifunction machine like this is "how good is the calc program?" Over the years, I have used *VisiCalc* (all versions), *SuperCalc* (all versions), *1-2-3*, *Magic Calc*, *PortaCalc* (on the TRS-80 Model 100), *CalcStar* and *MultiPlan*. *WorkSlate* works much better than *PortaCalc*, but not as well as any of the others for the normal micro.

There are three problem areas. First, *WorkSlate* has a limited memory. Second, *WorkSlate* is missing some (in my opinion) critical functions. The sort routine is virtually useless, since it will only sort rows containing whole numbers, and not sort rows containing formulas. It also lacks a square root and a log function. Both are necessary for many types of data and statistical analysis. Third, for size and portability, the keyboard is nonstandard. It's smaller than normal (okay, you do get used to it); it lacks both a shift key for your

right hand (if you're a touch typist, this will drive you crazy) and a number row over the keyboard leaving only the ten-key pad (the designers probably never entered a cell reference like "A1"). Also, there's no return key, but there is a key labeled "DO IT."

However, *WorkSlate* is portable, weighs only a few pounds, and runs like a dream. If you don't sort, log, or square, you'll find that you can create the same types of financial and analytical templates with *WorkSlate* as with any of the other programs.

WorkSlate has a great way of handling storage. There are five user areas in memory, and each area can expand to take over the entire available free space. Also, each microcassette has a five-template storage capacity. The first part of the tape is a directory. When you go to store your template, you designate where on the tape you want it to go, so there's no worry about overwriting previous work. It makes saving and storing as easy as using your portable tape recorder at home. I have used *WorkSlate* for about two months, and have never had a failure or a problem with the unit or the tape. —Woody Liswood

Teleram 3100

\$1595 (128K bubble memory); \$2095 (256K bubble memory). Teleram Communications Corp., 2 Corporate Park Dr., White Plains, NY 10604; 914/694-9270.

The Teleram 3100 is designed for the professional journalist. Its main strengths are the text editing and communications packages — both of which are well-suited for a journalist in the field who wants to compose an article and transmit it over the telephone — supported by a bubble memory which stores text even when power is off and can hold about 55 double-spaced pages of writing.

The text editor is very easy to use; my 11-year-old daughter had no trouble using it to draft a report on taking care of horses. It is also full of features that operate at the press of a function key:

center, move, copy, restore (for bringing back text you've deleted), search-and-replace and delete (word/line/sentence/paragraph/block/page).

The telecommunications package requires a careful study of the manual, but once you've gone through the steps it all makes sense and works fine. Uploading and downloading text — the main function a journalist would want this for — is almost pleasurable, an unusual phenomenon in telecommunications.

This is the bulkiest of the notebook size computers. But if you find yourself writing much more than a short article in between transmissions to your publisher, the Teleram may be your electronic salvation: 128K standard, 256K optional, non-volatile bubble memory makes this a rugged, dependable workhorse for us hacks. —Matthew McClure

Gavilan



\$3995. Integrated software included; optional printer \$985. Gavilan Computer Corp., 240 Hacienda Ave., Campbell, CA 95008; 408/379-8000.

Gavilan's portable computer is the first system I would consider as a *replacement* for a desktop model. It offers almost all the computing facilities you could ask for and comes in a most con-

venient, 9-pound, 11½-inch square form.

The best part of Gavilan, though, is the software that's been developed for the clever little beast: It's a fully integrated set of software, and that takes some explaining. "Integrated" gets applied to all manner of software — often incorrectly. In this case it's correct to say that all applications (word-processing, spreadsheet, analysis, forms-generation and appointment/tickler file functions) use a common interface — Gavilan's operating environment.

Better than that (from the user's standpoint), commands like Copy and Scroll are the same for all applications and do what you would expect them to. A complete help function tracks you at all times and answers such queries as "where am I?" and "what can I do next?"

Much has been made of the hardware features packed into Gavilan's compact frame, and they're substantial: an 8088 processor (rudimentarily compatible with the IBM PC) with 64K memory, expandable to 160K internally;

GRiD Compass

\$5995. GRiD Systems Corp., 2535 Garcia Avenue, Mountain View, CA 94041; 800/222-GRiD.

GRiD's Compass computer is two things: lovely and expensive. So expensive, in fact, that we're not going to dwell long on it. Base prices range from \$6,000 to \$8,000. Nicely integrated software (*GRiDWrite*, *-Print*, *-File*, *-Plot* and *-Plan*, which all work well and add another \$940 to the tab), 384K of bubble memory for data storage and Italianate product design make the Compass a good value, but alas, hardly affordable for most of us.

The Compass is powerful enough to be your only computer — one that can easily be tucked under your arm. The central processor is an Intel 8086,

more powerful sibling of the 8088 used by IBM in their PC and by most other PC-compatible machines. An optional 8087 math processor enhances Compass performance with spreadsheet, graphics and similar software. Main memory is 256KB, expandable to 512KB. Comparing the raw computing power of the Compass to, for example, the Radio Shack Model 100 is like the difference between a Ferrari and a VW Bug. Price differentials are equally dramatic.

The Compass' light weight (11 pounds) and compact design are partly due to the bubble memory embedded in the unit. This means you have to load and unload files and programs, either through data communications or the optional floppy and hard disk drives that GRiD offers (boost the tab \$1,195 and \$4,100, respectively, for these add-ons).

a built-in 300-baud modem; a 3½" disk able to store 360K (about 200 pages of text); a battery pack that supports operation away from the wall plug, typically for a period of eight hours.

The sexiest feature is the touchpad above the keyboard. This acts like the "mouse" that is becoming so popular, only you move the cursor and select items from a menu by moving your very own fingertip across the touchpad. I found the pad hard to get used to and a little inexact when placing a cursor directly on a specific character.

More important, however, is the screen: a 16-line, 80-column liquid-crystal display that handles all the text and graphic demands you can throw at it with Lisa-like grace. A screen this size really ties the whole Gavilan concept together — compromising as little as possible to obtain all the benefits of easy transport.

Gavilan should be reaching dealers about the time you read this. It has been delayed more than once, but it's worth

the wait. If you need a totally portable environment, the optional five-pound printer adds only three inches to Gavilan's overall length and produces good quality print, even though its \$985 price is a bit punitive.

We don't recommend the recently announced Gavilan SC model. It costs \$1000 less and lacks the elegant integrated software and built-in modem. You'd probably spend at least \$1000 on software for it (which would have to come from Gavilan because every program has to be tailored to the unique system) and it wouldn't all fit together as nicely as the \$4,000 system does.

The second disk drive is another option we don't see as valuable. It costs \$1,245 and includes memory expansion to 288K, but that seems unnecessary if you stick with the basic hardware/software package.

If you can afford the Gavilan, buy it. You'll get a well-thought-out combination that can open up options not available when you're tied to a desk. —RD

The other file transfer option, communications, is workable via GRiD's own network, which also has electronic mail features. This is inexpensive — \$100 registration fee, which includes 360KB of on-line storage, plus \$45 for the next 512KB of data. You will, of course, need a modem. GRiD's built-in 1200-baud version is \$800.

We know a number of Compass owners who are impressed with the machine, its portability, state-of-the-art design and manufacturer support. None of them bought their system with their unemployment checks, however; you can usually count on a total investment of \$8,000 to \$10,000 as all costs are racked up. That's why we recommend it only if you need a powerful, truly portable machine today. We think you can do much better, price-wise, if you can

wait until the end of this year when a number of functionally-similar and cheaper systems are due. —RD



Evaluated/ Not Recommended: The Xerox 1810/1845

Xerox 1810: \$2195.
1845 expansion unit: \$1195.
Xerox Square 006, Rochester, NY 14644;
716/423-5378.

Built-in software lets the 1810 act like a calculator, appointments calendar or word processor — pretty common stuff to see bundled. The 1810 also comes with an electronic "Rolodex." You can enter and remove names, find a name, or have the machine dial the number for you. With the phone option you can send data from the 1810 to a remote computer; the 1810 will also act like a speakerphone, dialing or answering the telephone at the press of a function key.

The 1810 has a built-in micro-cassette recorder (controlled by the function keys) that serves both as a data-storage device and a portable dictation unit. But you can't simultaneously play a tape and type on the word processor, which limits the machine's use for dictation/transcription.

The 1810 has a Link function connecting it to a Xerox 1845, a CP/M-based

expansion unit with 64K bytes of RAM and two disk drives. Unfortunately, the software for the 1810 doesn't work with the 1845. It's like having two separate universes: the 1810 can act as a keyboard for the 1845, using standard CP/M software; but the only storage/retrieval mechanism available for the 1810 software is its microcassette recorder.

There are some other problems with the 1810. The text-handling functions are slow: A medium-fast typist will easily overrun the keyboard buffer and lose characters. The word-processing software is adequate for jotting memos or ideas for a report, but continuous use for large projects would be tedious.

Xerox bills this product as an office in a briefcase. As is often the case with Xerox computer products, their concept (brilliant) is better than their execution (barely adequate). It's priced close to the Gavilan, which is generally its superior in terms of features and performance. If I were going to set up an office in a briefcase, I'd probably get a Radio Shack Model 100 and a portable microcassette recorder — saving enough for a week's vacation abroad for two.

—Matthew McClure

Typing in Your Notebook

If you plan on using a notebook computer enough to justify its purchase price, you'll need one that's comfortable to use. The keyboard is an important distinguishing characteristic on these computers. We found that the range went from quite comfortable to nearly impossible, depending on intended use.

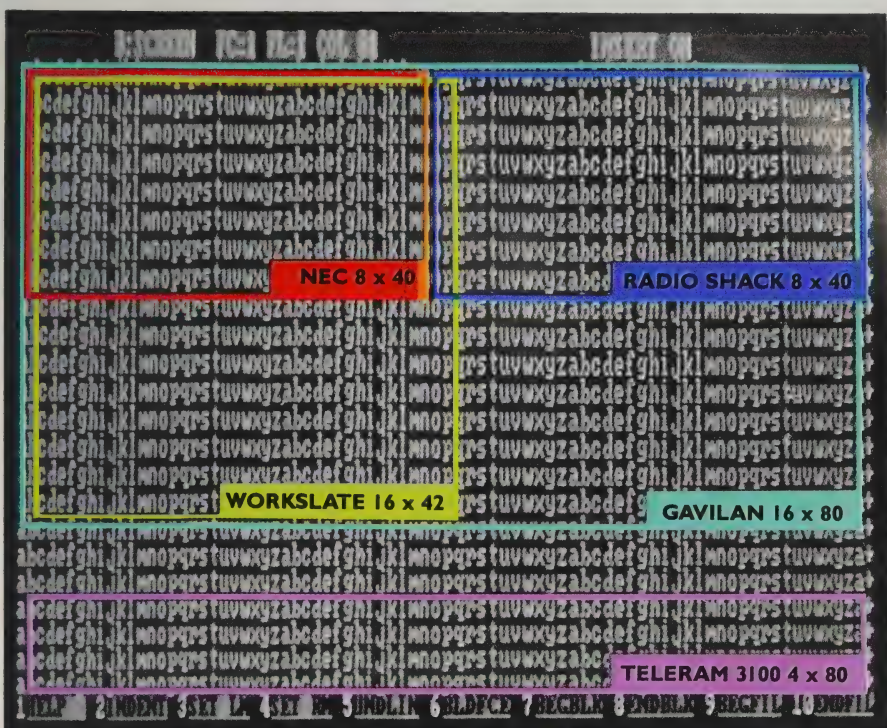
The Radio Shack Model 100 has an excellent feel and keyboard layout; its only drawback is its non-standard cursor-control keys. The touch is excellent — quiet yet with enough feedback that you know when you've struck a key. The placement of

the keys is standard Selectric, which is a distinct plus, no matter what you think about IBM as a corporation.

The keyboard on the NEC PC-8201 is similar to the Radio Shack's but with notable differences. First, the feel is not as nice. With the Radio Shack, you get no sense of extraneous motion or sound when you strike a key. With the NEC, there is more of a clackety-clack feeling — cheaper and not as well designed. The placement of some keys — especially the colon, apostrophe, quotation marks and delete/backspace — is

nonstandard. No big deal, but if you're used to one arrangement on all your other keyboards, it can be difficult to get used to the NEC. There is no numerical lock key for a numeric keypad, and there are only five function keys (the Model 100 has eight). Cursor keys, though, are nicely arranged in an intuitively obvious fashion, one of the NEC keyboard's best features.

The Gavilan's compact keyboard has a surprisingly lively touch: It takes very little pressure to depress a key, so a touch typist can work rapidly in the confidence that all the keystrokes are getting recorded.



Screen size can make a critical difference in notebook computers, especially if you use one for extensive writing. We've overlaid the screen dimensions of each machine on the standard 80 column, 24 line CRT screen used with most desktop computers. The Grid Compass has an 80 x 24 display, but that's squeezed into a 6" screen, as opposed to the 12" screen used with most desktops.

There's a numeric keypad, which is a plus if your work entails much number entry and you're used to a ten-key adding machine/calculator. The arrangement of most of the keys is standard and comfortable; the only exceptions are the cursor-control keys, which have been replaced by a touch-sensitive screen.

The Grid Compass 1101 has an undistinguished keyboard with a clunky feel. The touch is heavy, so if you're used to typing fast you'll have to slow down and pound these keys. The location of the apostrophe/quotation mark key is particularly unfortunate — it's just to the right of the P. If you

try to type an apostrophe where it's usually found, you'll hit the RETURN key, which may prove disturbing if not disastrous. The Compass doesn't have a numeric keypad, but its cursor keys are nicely arranged.

The layout and feel of the Teleram 3100 are fine. The only problem is that the keys are too sensitive: It's hard to adjust your fingers to a touch that won't give you double characters. Aside from the sensitivity and a somewhat bewildering collection of 28 function/cursor-control keys, this keyboard is satisfactory.

The WorkSlate's keyboard is unfortunate

for anyone who has to do extensive typing. The keys are circular in shape, which makes hitting the right one problematical if you're used to sculptured keytops. Astonishingly, there is no shift key for the right hand; if you want a capital A, I guess you either use the shift lock or else do some kind of Liberace move, crossing your right hand over the left to reach the shift key. WorkSlate has a diamond-shaped cursor-control key — sensible and easy to use. It also has a 16-key numeric pad, which makes it excellent for spreadsheet and other number-intensive applications.

—MM

ONE PICTURE IS WORTH 10^6 WORDS

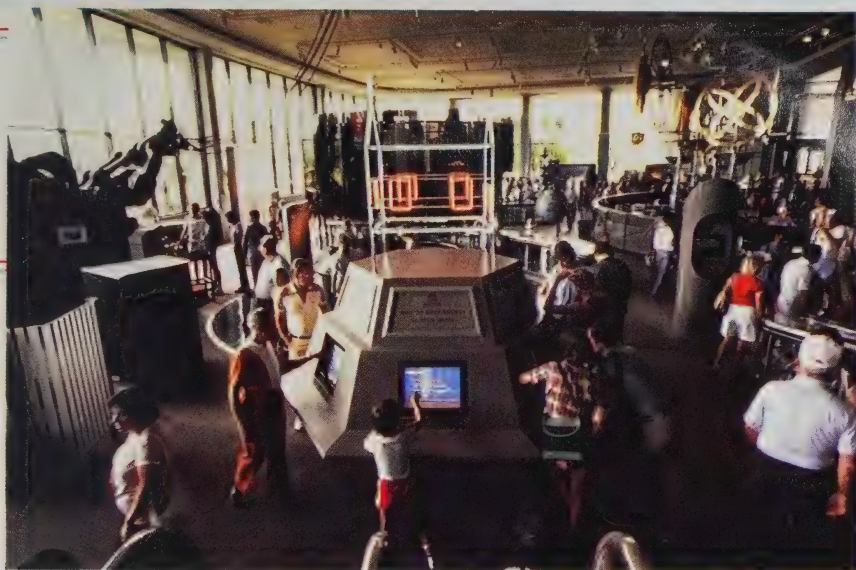
As everyone laments television's untapped potential for education, the wizards of high tech are devising new uses for the hottest instructional medium yet: the combination of TV and the computer — the interactive videodisc. The beauty of television is its verisimilitude; it gives us information just like real life — well, at least with sight and sound, two of our main learning senses. The beauty of computers is their ability to quickly wrest order out of chaos, accepting input and making decisions accordingly. Put them together and you have a teaching tool that works like Experience, the Best Teacher.

Like many other pieces of the New Technology, interactive videodisc is just emerging from its gestational phase. Some programs are reaching the marketplace for specialized niches — teaching people WordStar and VisiCalc, fundamentals of automobile repair, speed reading, CPR, master classes in cooking and photography — and, of course, the arcades. Once the precocious infant grows up and flexes its muscles, gets married to expert systems and computer-generated special effects, we'll get an idea of the breadth and depth of its power.

Videodiscs allow the whole range of television tricks: color; freeze-frame, which stops the action; dual sound, so you can listen in one language, flick a switch and listen again in another; and random access and branching, so the computer can choose which of the 50,000 frames on the disc to display. These characteristics give optical mass-storage technology its revolutionary possibilities for education, bringing B.F. Skinner's ideas of programmed instruction into the Space Age. Interactive video lets the viewer participate in the viewing, customizing the script as necessary, reacting to the information presented, and giving the computer feedback that lets machine teach human with more patience and intelligence than the usual two-legged teacher.

The curve of technological change vs. time is hyperbolic. Computers have only been around for forty years, television about the same. Optical memory storage greatly increases the information density, so more can be contained in less space at less expense — in production-run quantities, videodiscs are cheaper to produce than videotapes. If they follow the same kind of price curve we've seen in other parts of the New Technology, interactive video will widen the spectrum of applications for microcomputers; consider what you could do with the entire Encyclopedia Britannica plugged into your Apple, Commodore or PC — or a Berlitz course in Arabic designed to let you progress at your own pace — or, as Mark Dillon suggests, an interactive atlas. It suggests one of Bucky Fuller's flamboyant prognostications: "The videodisc will free us to become comprehensible again."

—Matthew McClure



In EPCOT's "Communicore" building, an interactive videodisc kiosk developed by author Dillon's company, Interac Corporation.

by Mark K. Dillon

Most people have experienced the videodisc only as a playback medium for films and find it difficult to see the disc for what it is — an "image ROM." Digitizing the 108,000 analog video images accessible on a video disc would require more than 50,000,000 bytes (50,000 megabytes) of magnetic disk space. These astronomical storage demands explain why computers have not been used to handle high-resolution images online. Graphics are hungry enough consumers of disk space, requiring about 16K bytes for a full-screen bit map. The digital presentation of a single photograph requires more than 500K bytes read out in less than $1/30$ of a second. That is more than 120 million bits per second. Such numbers even cause mainframes to "overheat."

The terrifically high storage of images has dictated almost total dependence on alphanumeric as the sole means of communication between people and computers. Consequently, computers have not succeeded in the home, and will not succeed if text remains the principal human/machine interface.

Language, whether spoken or written, is no longer a sufficiently powerful medium to communicate the information requirements we now have as a culture. To fault the written word for insufficient clarity,

appropriateness and elegance will cause English teachers worldwide to call for bonfires fueled by modems, database programs and video monitors. Still, words are too slow a communication tool for most of our needs. On the average we read about 500 words per minute, listen at 250 words per minute, and type at about 50 words per minute. Psychovisual studies indicate that we "watch" at 14 million words per minute.

The success of videodisc-based information systems stems from

their reliance upon the natural strengths of the human nervous system. Humankind's most powerful information-processing centers are those designed to interpret visual images, not text. Whether calculating complicated trajectories required for throwing a spear at a speeding deer, driving a car through freeway traffic, or recognizing the face of a friend in a crowd, the visual cortex is unmatched in its speed and information-processing ability.

It is not surprising, therefore, that the best way to transfer information to another individual is via a personal demonstration. The next best way is to show the person with pictures. Difficulties arise in trying to explain something with no visual tools. Almost no one can write an explanation for doing something that will be understood by a satisfactory majority of its readers.

Those who find this last statement preposterous should put down this article, go into the kitchen, take out Julia Child's *Art of French Cooking*, Vol. I, and turn to page 571. Here you will find instructions for "Boned Stuffed Duck Baked in a Pastry Crust" explained in good detail. This Saturday, try to make it. But first cover up all the illustrations.

At the very least, computer-controlled videodiscs will provide comprehensive databases and reference sources. Videodisc-based atlases will allow one to see, in great detail, graphic and photographic representations of the earth right down to the street-

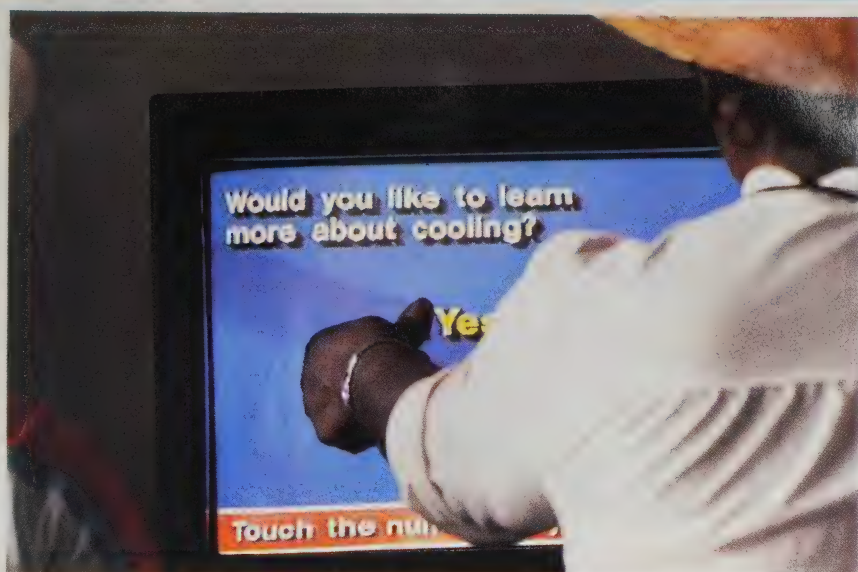


Interactive videodisc presentation at Epcot: design a roller coaster or plan a trip.

corner level. Among the chapters and sections of a videodisc atlas would be photographs of cities, street by street; satellite images; historical maps; same locations in different seasons; and a few words in the language of the inhabitants. Such videodisc documents currently exist, but only as military-intelligence resources.

At some later date, you will be able to plug your PC into an unruly home appliance and have your microprocessor talk to its microprocessor. After they have properly analyzed the reason for the current malfunction, your manufacturer-supplied videodisc will show you where the fault lies, what parts are required to fix it, what tools are needed, and a step-by-step full-color instruction on how to do the repair yourself.

These repair and maintenance systems are now supplied to the government and private industry as part of new product systems.



Touching the screen controls the program in Interac's videodisc presentation at Epcot.

What if you want to learn woodworking, photography, French cooking, CPR or how to do almost anything? A videodisc curriculum will soon be available to teach you in a way books never could.

Because imageware (the fusion of videodisc and computer technology) is interactive, the programs evaluate your interest level, ability and resources and can customize the presentation of information to meet your requirements. What we have here are consumer "expert systems" which can make available the skill, know-how and expertise of those few truly talented individuals in any field.

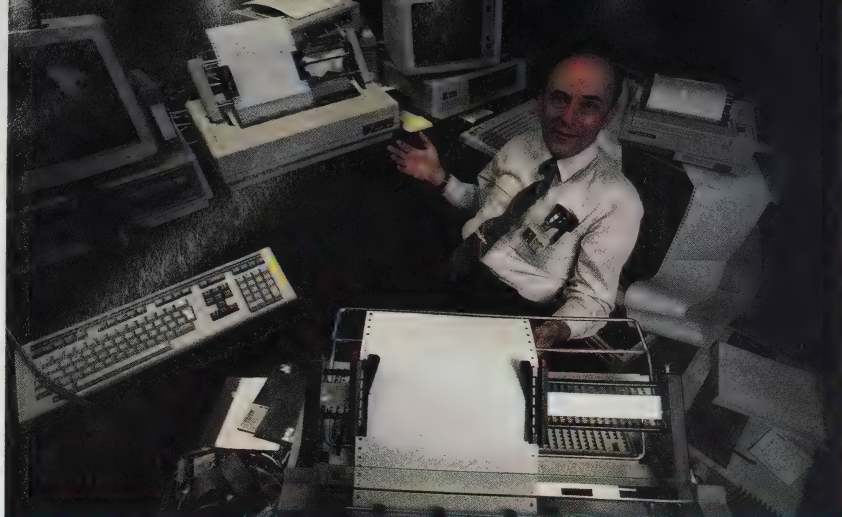
If this all seems a bit too heavy on speculation and too light on what is available off the shelf, it is because the videodisc has come upon us so fast that most people have never seen a computer-controlled videodisc system of any kind do anything. Our company, Interac Corporation, produced

computer-controlled videodisc systems for Disney's Epcot Center, which is often the first place someone today encounters intelligent videodisc systems. At Epcot, you can build a roller coaster or plan a trip on one of our interactive videodisc systems merely by touching the screen.

Within a few months, we will have similar systems in major retail stores, "expert salespersons" that will allow you to find out all you want to know about sophisticated consumer electronics but have been unable to learn because you couldn't find a knowledgeable salesperson.

None of the examples mentioned above are speculative. They are all references to actual systems presently online in governmental and industrial environments. The question is not whether these systems will find their way into the home, but when.

Look for them by summer. **END**



Matt Herron

PRINTER PRO'S PICKS

by Charles Stevenson

In my job at MicroPro, I test the way dozens of printers work with *WordStar*. Printers must be told via a set of commands sent by the word processor to do things like boldfacing, underlining, and ending a line. These commands vary from one printer to another. Most software vendors put commands in the word processing program for a few top-selling printers, and then list these printers on an installation menu so you can select one. However, you aren't restricted to the printers listed in the menu. Many printers emulate the codes used by other, more popular printers. Knowing which printers emulate others well can open your choices and often save your money. (You can enter codes yourself using *WordStar's* installation program. However, if you are new to computers, learning which codes to enter may be mysterious, confusing and often frustrating.)

My standards for printers start with one rule: a printer must be able to control its own environment. I exclude any printer that can't easily do the printing enhancements available with *WordStar*. For example, printers that can't do a carriage return without a line feed have to advance the paper at the end of a line and therefore can't back up to add enhancements like boldfacing and underlining. Although service is never a problem for me, my second rule is that the printer must be reliable. With these rules

in mind, here are some of my favorites. Each of these printers can be selected from the *WordStar* menu either by name or by the name of the printer it emulates.

If I were going to buy a high-speed, letter-quality printer I'd pick a Qume Sprint 11/40 Plus. It's packaged well, priced well at \$1,776 and has all the features I need for normal word processing. The forms tractor does the best job I've seen of keeping the paper aligned and properly stretched across the platen. Connecting the printer to specific computers is elegantly

handled with customized cartridges that cost \$95 (not much more than most cables alone). For an extra \$200 you can increase speed from 40 cps (characters per second) to 55.

Another favorite in this category is the Diablo API ECS, second only because of its higher price (about \$3,000). It's a workhorse, but more than I need. However, this printer is the one answer if you want more than 96 characters on a printwheel. With the additional characters, you can print the full IBM PC character set and therefore print out screens (character screens, but not graphic screens). The printer interface is in the cable, not the hardware, which means it can be configured for oddball hardware combinations.

In the lower speed letter-quality printer range it's a toss-up. I'd go with the Brother HR15 or 25 or the Silver Reed 500 or 550. Prices range from \$500 to \$800; speeds are 12 to 23 cps. All four can handle Diablo escape sequences, which means that if "Diablo" is a printer choice in your word processor, you simply select it; no further configuration is necessary. The Brother printers have a single-tray sheet feeder (\$200) that works well, and an add-on keyboard (\$200) so you can use the printer as a typewriter. However, you must order ribbons from Brother. Silver Reed printers, on the other hand, use Olivetti cartridges, which are widely available. Both have proprietary print wheels. (Note: Brother sells its printers to other companies that market them under their names. The Dynax printer, for example, is a Brother in disguise.)

For faster printing, you'll need to look at dot matrix printers. The high-end printers (more than

- WordStar commands variable and alter
- (The examples below
- This shows
- This shows
- This shows vari
- This shows variable pi
- This shows variable pitch. (< ^

Prowriter's dot-matrix print. Fairly standard for the breed: not great, but legible. Pitch variation is a plus.

\$1,000) are relatively fast (200 cps) in draft quality and often simulate letter-quality printers at much lower speeds. Of the relatively small number of these printers I've worked with, I like four: Qantex 7040 (\$1,703), which emulates the Diablo; Toshiba P1350 (\$1,499), which emulates the Qume; a nice model by Ricoh that operates like a Diablo in letter-quality mode; and Durango's Poppy Writer. All have wide carriages for 14-inch paper. Some warnings: All of these printers tend to be noisy and most use proprietary ribbons. Buy a bunch of ribbons when you buy the printer and know where you can get more. Test the Toshiba before buying by selecting the Qume option on the *WordStar* menu. Early models didn't work right.

The dot matrix printer I'm most intrigued with at the moment is Texas Instruments' Omni 855. It falls into a middle range for price (\$900) and speed (150 cps). This printer emulates the Qume. It's compact, lightweight, can do single sheets, and has good printing quality, a very easy paper-loading tractor, and a paper tray that keeps paper properly separated. You can control character and line spacing and choose draft- or letter-quality

SPECIAL PRINTING CAPABILITIES INCLUDE:

Boldface, Double Strike, Underline
Strikeout, Overprint
SUPERScript
SUBScript
and any combination

SPECIAL PRINTING CAPABI

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SUBScript
and any combination --

This compares the TI Omni 855 (in slowed-down, "letter quality" mode) with the Brother HR25. They are similar in cost but the Omni 855 can print faster (150 cps) if you're willing to sacrifice print quality. The Brother looks most typewriter-like.

printing either by giving *WordStar* commands or by pushing buttons on the front of the machine. In addition, you can insert up to three print font cartridges in the front and select any of these typefaces with the push buttons.

At the low end — the slower, less expensive dot matrix printers — I'd recommend the C Itoh 8510 (also known as the Prowriter 1) or their other models, the 1550, with a wider carriage, and the color version of the 8510. C Itoh printers are workhorses at low cost (\$350-\$400) and unlike Epson and Okidata there are few compatibility problems within the product line. There is no such thing as a standard Epson MX80; that is, there are actually six MX80s, each different, and there's no way to tell which is which by looking at them. This means you can't simply select "Epson MX80" from a word processing printer menu and expect it to work. One of the six will; you have to try them to find out which. Okidata printers have a similar problem — each one is different.

What's coming next? I think we're beginning to see some standardization in hardware (with the 8088 processor and assorted cousins, and the 68000) and in mass storage (5¼" floppy and hard disks). The next standards will be for printers. Companies will begin developing a hierarchy of printing devices that use the same commands. This means you'll no longer have to change the printer selection in your word processor to use different printers.

In addition, I expect to see copy machines integrated with printers as laser technology now used in the Xerox 2700 and IBM document writer becomes available for under \$5,000. With this type of relatively low cost "page printer," bits are copied directly from the computer's memory to a character generator on a printing drum similar to those used in copy machines. Graphics and special text fonts are easily produced and cleanly integrated and the machines will be able to roll out multiple copies at a rate of five to ten pages a minute.

END

HP ThinkJet Printer

Requires: Centronics, HP-IB, or HP-IL interfaces.
\$495. Hewlett-Packard, 1820 Embarcadero Rd., Palo Alto, CA 94303; 800/FOR-HPPC.

Shortly before we went to press, a small unmarked cardboard box with no return address arrived in my office. I opened the package and, because Hewlett-Packard's release date for the ThinkJet printer inside was still a month away, whisked it home to test it out secretly.

At 8 x 11½ x 3½ inches, this cute little bugger takes as much desk space as a large book and is just as easy to carry. It weighs less than six pounds and it's tidy.

Took ten minutes to put it together. Pieces pop into their obvious places, and paper loading is a snap: no bizarre wire cages for paper to be threaded through, no ribbon to dodge or change, no parts falling off when it's carried about.

The ThinkJet is a delightful printer — fast, quiet and portable. Instead of mechanical printheads and ribbons, it uses a small, disposable, ink-filled cartridge that slides into a tray at the front of the machine. It paints characters on paper by spraying ink through several tiny holes in the printhead, a thin metal plate on the front of the cartridge. A throw-away printhead with no moving parts? Yep.

Spraying ink onto a page is significantly quieter (under 50 decibels) than stamping a page with ink. Most printers intrude like jackhammers on a Spring morning. This printer whooshes along unobtrusively in the background.

And it's fast: 150 characters per second (one and a half times faster than a Gemini 10 dot matrix). Bold and underlining don't slow it down.

Print quality is excellent. Not perfect letter quality, but the lines are much finer than dot matrix — and they're always the same. You'll never see faint characters from tired ribbons. With this

Dot-addressable graphics
96 x 96 dots/inch
96 vertical x 192

Four print pitches
Compressed (142 characters/line)
Normal (80 characters/line)
Expanded compressed
Expanded

One-pass underline and

ThinkJet is a little more readable than most dot matrix printers, but doesn't approach the Brother, shown on the opposite page.

printer, just as with a fountain pen, you either have ink or you don't. (I hated typewriter ribbons and I hate printer ribbons. There's no clean, easy way to wind a ribbon through all the gates and latches buried somewhere inside most printers. My dot matrix printer is covered with smudgy thumb prints as are too many manuscript pages.)

The ThinkJet works with most computers. It comes with industry standard Centronix parallel, HP-IB or HP-IL (battery) interfaces. I've used it with a Kaypro 10, Compaq and HP-150. HP claims it works with IBM, Apple, Texas Instruments, Radio Shack and others. The instruction manual is terrific.

What's the hook? You'll probably want to buy special uncoated paper (characters looked spidery on my normal fan-fold paper). According to HP, uncoated paper is not more expensive, but might be harder to find. Cartridges sell for less than \$10 — more than the cheapest printer ribbons but considerably less than new printheads (the printhead on my other printer wore out in six months). Available only from Hewlett-Packard right now, the cartridges are claimed to have a 500-page life.

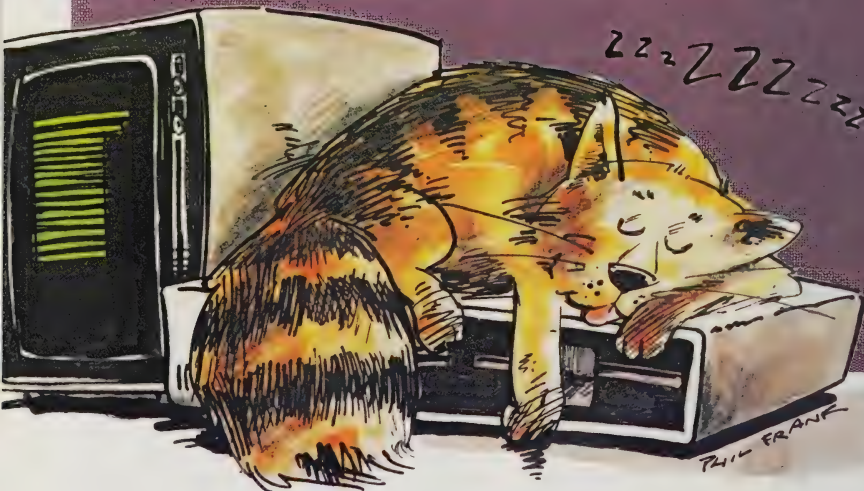
The ThinkJet costs \$495. I think it's worth every penny for the peace and quiet alone. Clean thumbs and portability are bonuses. —Barbara Robertson

Like people with some horrible disease, personal computer users band together in support groups to share knowledge and offer assistance. Sometimes they meet as local chapters of formal users' groups focused on a single type of machine; others consult electronic bulletin boards and communication networks for help. We check in regularly with a networked group of Kaypro owners, which got us started on the following article.

There's no question that the proper care and feeding of a personal computer is a subject of concern — the difficulty is in finding definitive answers to seemingly simple questions. We plan to keep looking for the elusive "right" answer and welcome your participation in the search.

—RD

KAT FUR IN THE DISK DRIVE



Phil Frank

Pro-Files magazine ran a scary picture of a badly wounded disk read/write head, so I rushed out to buy a cleaning kit. The "Perfect-Data" kit sold for \$35 at a nearby dealer: two cleaning disks and four ounces of some chemical. Ouch! After another day's shopping, I found the same contents in a \$30 box at Radio Shack. Ooof! The instructions say to clean the heads twice a week, and to buy another \$30 kit after 26 cleanings. Since I have two disk drives, that's about a month and a half before I have to go buy another kit. A monthly "rental" of \$20 on my hapless little Kaypro.

The instructions say to insert the moistened cleaner disk with the label facing the open drive latch — wherever that is on the TRS-80. On my machine the latch is above the slot (my Kaypro has horizontal slots). That means the white cleaning material will be facing down. Another instruction says that the white material should face the head. Well, nobody ever told me where the head is. When I look, I can't help thinking that the knob at the top is the head — and that the white stuff should face up instead of down.

All this hype about constant cleaning and 13 washes to the disk is a con game, isn't it? Keep the dealers happy by helping them fleece the customers?

—Alfred Lee

I don't know how much is con and how much is pseudo-science, but my Kaypro's been running for more than a year without cleaning, with daily assaults of cigarette smoke, cookie crumbs, greasy paws and all the rest, and I'm still waiting for disk errors.

—Richard Dalton

I work on the assumption that the drive heads on the Kaypro are on the bottoms of the disk. Have I guessed right? My guess is the opposite of Al's, if I remember correctly.

—Steven Sander Ross

When you aren't using the machine, and it's just sitting there on your work table, should the drive doors be left open or closed? I say closed to keep out cat hair, others say open so you don't stretch the latch spring. Any other comments?

—Mary Swigonski

Jeez, Mary, now we've got cat fur and latch springs in the act. I wonder if I should leave my car doors open at night to relieve tension on the hinges. If the same myths applied to automobiles, we would probably wind up putting the beasts on blocks every time we took them to the corner store.

—Richard Dalton

I clean the heads on my disk drives once in a while, using a dry cleaning disk, which supposedly scrapes away any contamination. I have friends who smoke around their systems all the time and they don't seem to get many disk failures either. Software errors that muck up the disk directory and make files unretrievable seem to occur much more frequently than physical media failures.

—Louis Jaffe

I have had some problems with garbage on the disk heads. I clean them every week with the stuff Louis Jaffe uses. There was immediate improvement.

—Bob Cowan

I have used my Kaypro for about a year, often several hours a day. Recently I had to take it in to the shop to get the heads aligned, at the southern regional repair center for Kaypros. The repairman said my heads were not very dirty at all, and if the machine was used in a clean environment, cleaning every six months or so was plenty. He was a crusty old man who had been in the disk-drive repair business for some time — at least he looked very believable and had nothing to gain by telling me false information. So I still don't own a head-cleaning kit, but intend to

get one next year sometime.

We have four cats and I'm sure that my disks have cat hairs on them, as does everything else in this house. —*Dr. Dick Schoech*

Some people have told me not to clean the heads at all. Something about wearing them down. I have found that the heads do get dirty once in a while, giving some read/write errors. That is, unless you're a nonsmoker in an air-conditioned building with no cats. So I compromise. Once every few months when I get some disk error that makes me suspicious, I clean the heads. I assume the drive head is on top, because I assume it reads the side of the diskette that appears to be the top.

I never turn the computer on or off with disks in the drive. On power-up, the CPU issues *random* instructions for a split second. It's the old monkey at the keyboard, and the monkey is sometimes clever enough to issue an "erase sector" instruction to the drive.

Never close your drive doors without disks (or the inserts) in the drives. It presses the drive head against the pressure pad on the other side. I've been told it can scratch it. —*Darrell Icenogle*

I (1) never clean my heads, even after using the bathroom, and (2) I reset whenever I feel like it, but (3) I carefully remove the disks before turning off the machine, which (4) I do frequently. A fool's paradise, any way you look at it.

—*Stewart Brand*

Why do all these tips sound like the joke about the guy scrubbing down his front lawn with detergent to keep the elephants away?

—*Richard Dalton*

With all this folklore and

conflicting advice, we decided to approach the experts — people who build disk drives.

John Sawczyn, of Shugart's technical support department, says: "Basically, you don't fix a ticking clock. If you have a lot of interchange between disks and keep getting recoverable errors, you might consider checking the alignment and making sure the read/write heads are clean. Or, if you have a particularly dirty environment, you might want to clean your heads more often.

"Our technical bulletin advises cleaning the heads about once a month, or every 40 hours of productive usage. The only head-cleaning diskette we recommend is the one from PerfectData; the others are either ineffective or too abrasive.

"In any case, you have to know what you're doing. Too many hobbyists, or people who really don't know about the operation of a disk drive, have caused more harm than good by trying to clean their own heads. They seem to think a disk drive is some kind of sturdy industrial machine that can take all sorts of punishment. It's more like a record player; you wouldn't just drop the needle on the turntable without expecting to incur some kind of damage."

Vic Fisher, Product Specialist for Tandon:

"As far as Tandon is concerned, you really don't need to clean the heads if you use a new, good-quality media. That should clean the heads sufficiently. You never want to use a dry kit at all. Period. Most of them are burishing types and they can damage the head. If the head is caked up from using inferior media, it will need to be cleaned by a qualified technician. When there is no media in the drive,

"Too many hobbyists . . . have caused more harm than good by trying to clean their own heads."
—John Sawczuk



James Donnelly

Above: one of the few computer hobbyists who caused more good than harm by trying to clean his own head.

you should keep the latch open so the heads don't come into contact with each other.

"We have a lot of different computers in our office and we turn them on and off all the time, with no problems.

"Moving your system around with the door closed and nothing to protect the heads — like a shipping insert or a piece of media — can damage the heads. The shipping inserts are designed to protect them.

"If the system has a cooling fan in it that draws air in through the front of the disk drive, where there are a lot of particulate contaminants in the air, particles will be sucked in and over the face of the diskette, causing excessive media wear. But normally a standard air-conditioned office environment is clean enough to protect the heads."

Susan Wolf, head of the technical department at RANA Systems:

"The doors are really no big deal, but I would personally recommend leaving them open. We don't recommend head clean-

ing. A disk drive's not like a cassette recorder, where the media is actually touching the heads.

"With a floppy, the heads are riding on a cushion of air, so they don't get dirty as often. We do recommend cleaning the heads once every four to six months of heavy use in a dirty environment, once a year otherwise. We recommend a double-sided head cleaner — a dry kit that does burnish the heads, though this can cause some additional wear.

"I don't see any reason why you'd want to leave your computer on. The only thing that could do is heat up the computer. As far as the floppy goes, if the drives are off — in other words, if there's no program doing read/write access to the disk — it won't matter whether the machine is left on or not.

"You should handle cat fur in the air the same way you would lots of dust — clean the heads a little more often. Our disk drives have little ventilation holes in the disk chassis, but they're just for looks. Our drives don't need them — not enough heat is generated to require ventilation." **END**

Selling in the Twilight Zone

by Richard Dalton, Charles Spezzano, James Johnson, respectively

Things produced by a computer are given a credibility that isn't always appropriate. Perhaps it's because many of us are uncomfortable about what goes on inside the bloody things and are embarrassed to ask hard questions. For example, people often think computer-generated accounting reports are more factual than manually prepared ones. That's a shame, because the veracity of a computer report is dependent on the skill and knowledge of the system designer and the programmer who conspired to produce the result, not to mention the people entering the data. Sometimes computer manipulations are auditable and you can establish with reasonable certainty that the end result is what it should be.

The Sales Edge, however, produced by Human Edge Software, isn't that easy to assess. It is claimed to be a way for salespeople to improve their dealings (and successes) with prospective buyers. The program uses fairly standard psychometric techniques to gather information, first about the salesperson, then about the client. The result is a set of recommendations about how the salesperson can communicate with and, of course, sell the prospect on the widgets or whatever the company is making.

Selling is a much maligned profession. I have spent time both as a salesman and sales manager and understand the difficulty of balancing personal beliefs and sales quotas. Am I being manipulative? How about honest (forget about black and white)? Is the service I provide — bringing this information to a prospect — worth the cost it adds to the product?

The Sales Edge raises purely technical questions along with these philosophical ruminations. Is the

program competently designed and constructed? Are the theories that underlie it valid? Overriding all these questions is a simpler one: *Does it work?* Will it help a salesperson get the message across to the client, deal with objections and close the sale?

These are tough questions that I don't think we can resolve here. The resolution isn't rhetorical; it's pragmatic. *The Sales Edge* hasn't been around long enough to be thoroughly tested in real-life situations, so we'd like to hear from anyone who decides to try it. Let us know if it improves a salesperson's ability to communicate with prospects; if it engenders more confidence (an important issue by itself); if it enables salespeople and managers to communicate more effectively — a critical side-issue, often ignored.

We have a rare opportunity here to give some insight into the guts of a new software category. Charlie Spezzano, as regular readers know, is both a software evaluator and a practicing/teaching psycholo-

gist: The president of Human Edge Software, James Johnson, also holds a doctorate in psychology. We asked each to comment on the program.

Our recommendation: At \$250, *The Sales Edge* is worth a try. I would give it to a sales manager I knew to be a practical individual for testing with a sampling of salespeople and well-known prospects. I would look for the answer to one question from that manager: Does the program work? As with any other type of software, that, at the end of the controversy, is the real question.

—Richard Dalton

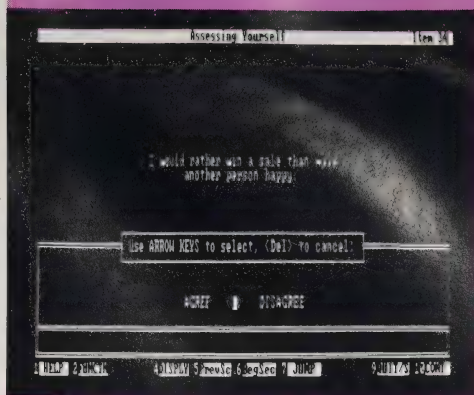
[The following comments by Drs. Spezzano and Johnson have been edited. —RD]

The Sales Edge from Human Edge Software is not a program for the morally fainthearted. Its purpose is to psychologically match you (the salesperson) with your prospect so you can most effectively manipulate that person, "by hook or by crook," into buying what you are selling.

Between college and graduate school, I spent some time trying to sell insurance. Now I find myself reviewing a piece of computer software that uses tools devised by psychologists to give salespeople "the edge" over the customer. As the world turns.

This edge depends, however, on the way you position yourself and your product during the sales process. I've paid a lot of attention to the word "position" ever since I read a book by advertising executives Al Ries and Jack Trout called *Positioning: The Battle for Your Mind*. *The Sales Edge* is ultimately an aid in the battle for control of the customer's mind. If you can carefully position the elements in the interaction, your prospects will have no choice but to buy from you.

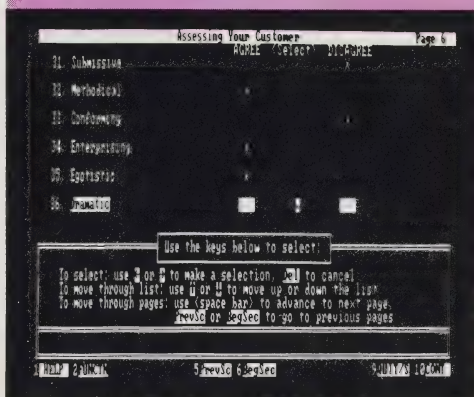
With *The Sales Edge* you assess yourself by answering a hundred true or false questions, such as "you prefer to lead rather than follow" and "you are ambitious." The



THE SALES EDGE

IBM PC/compatibles, 128K; Apple II+, IIe/compatibles, 48K; 80-column printer. \$250. Copy protected? YES. Human Edge Software Corporation, 2445 Faber Place, Palo Alto, CA 94303; 800/624-5227 (in CA, 800/824-7325).

The *Sales Edge* starts with questions about yourself (above) and your prospect's characteristics (below) that you agree or disagree with. These answers build profiles that the software matches up and uses as a base to recommend sales strategies.



manual does not explain the psychological principles behind the analysis of this test (or of the next one, in which you agree or disagree to adjectives describing your prospect); but the assessment resembles such well known "objective personality tests" as the Minnesota Multiphasic Personality Inventory. I assume, therefore, that the pattern of your true and false answers suggests certain personality traits you

are likely to have. For a psychologist, this ain't no little assumption.

What evidence is there that the test measures what it says it does? For example, did the authors give the self-assessment inventory to 500 people? Did they then have experts in personality assessment study those people to determine which answer patterns were associated with which personality profiles? If they did, it would be relevant to mention that. If they didn't, then potential buyers of *The Sales Edge* have to take it on faith that the program's evaluation of their personalities will amount to more than a bag of glorified fortune cookies.

Then there's a ballpark full of questions about the likelihood of matching the self- and customer assessments to predict accurately how the salesperson should behave to influence the buyer. Research is supposed to determine that sort of stuff too. For example, did the authors select 100 salespeople and then randomly assign them to two groups? Did they then give one group *The Sales Edge* package and have the other group listen to a record of Art Linkletter lecturing on the relationship of honesty and success? Finally, did they measure the increase in sales dollars earned by

both groups during the next year to demonstrate that *The Sales Edge* group out-improved the Art Linkletter group?

If they didn't, you'll have to take another great leap of faith before you can base your sales strategy on the report the program generates from those self- and customer assessments.

On the other hand, if your sales are down, and you think you are a pretty good judge of character (your own as well as others), and if you don't mind spending \$250 for a few pages of possibly true hypotheses about personality and sales, then *The Sales Edge* may be perfect for you. Or if sales are up and you have a few extra bucks, you could spend them on this fascinating piece of software. With the program you'll get a well written manual with instructions you won't need, since the first menu to appear on the screen will make everything you need to do self-evident.

The Sales Edge is less sophisticated psychologically than it pretends to be, but it does offer new salespeople a way to organize their thinking about a particular prospect, and this could prove very valuable.

Sometimes any theory or plan of action is better than none at all.

—Charles Spezzano, Ph.D.

Dr. Johnson responds:

We appreciate Dr. Spezzano's review. Unfortunately, his background in psychology as opposed to expert systems (the basis for *The Sales Edge*) confused him into believing that the program was a mere tool for psychological analysis. This misunderstanding detracted from some otherwise interesting thoughts and comments.

The Sales Edge is a knowledge-based expert system, not a psychological weapon to be employed on a victim as Spezzano suggests. The purpose for using *The Sales Edge* is to attain the high level of performance an expert sales consultant

might help a person achieve — by using tricks of the trade and inference patterns drawn from years of experience. To use an expert sales consultation program does not imply that a psychological analysis will be used to exploit people.

With *The Sales Edge* users can profit from the experience of authorities in the sales profession as well as behavioral scientists. The program development was based on the experience and knowledge of experts along with hundreds of research publications and interviews. In practice, it uses this material to evaluate the human factors of a sales situation just as a sales expert would.

You get advice on the best approach to the prospect. The tone is supportive and direct — perhaps a bit dogmatic.

bargaining. Avoid accommodating and giving in to everything Mr. G. . . wants just to be seen as a "nice guy". Keep focused on achieving a mutually satisfying business agreement.

FOLLOW YOUR INSTINCTS

You should have little difficulty interacting with Mr. G. . . He is willing to work to achieve his goals. Assist him in this. Expect him to question, probe and bargain with you if he is interested in your product. Be prepared to give Mr. G. . . the information he wants. Promote your product in terms of how it can contribute to his productivity, success, and personal achievement.

TAKE THE LEAD

Mr. G. . . is flexible, changeable, and can be easily influenced. He prefers a product that is innovative or new. With your product knowledge, ability to influence, and personal achievement, you can contribute to his productivity, success, and personal achievement.

Indeed, the basis of our approach is discussed in the widely used work, *Building Expert Systems*, edited by F. Hayes-Roth, R. Waterman, and D. Lenat. This approach involves gathering a collection of specialized facts, procedures and judgment rules from a broad range of sources. Apparently, Dr. Spezzano is unfamiliar with this approach.

Early in the review it is evident that Spezzano has fatally misunderstood the product, failing to recognize that *The Sales Edge* is a knowledge-based tool. This misapprehension is clearly revealed when he says that the purpose of *The Sales Edge* is "to psychologically match you (the salesperson) with your prospect so you can most effectively manipulate that person 'by hook or by crook' into buying what you are selling." Obviously, *The Sales Edge* does not make use of psychological "voodoo" to "match" a salesperson with a buyer. In developing *The Sales Edge*, Human Edge Software spent more than \$500,000 to determine what experts on sales would do in specific situations.

The reviewer compounds his initial misunderstanding by suggesting that sellers "manipulate" clients into buying products they do not want. To be successful in sales it would be foolish to rely upon manipulation. Indeed, a successful salesperson relies upon approaching potential buyers in an amicable atmosphere, assessing their desires, and then satisfying their needs. For salespeople to use *The Sales Edge* to

present themselves to a customer in a positive and pleasant way is about as manipulative as dressing appropriately or using toothpaste and deodorant.

One of Dr. Spezzano's most amusing and yet revealing comments is that users assess themselves with *The Sales Edge* program by answering a hundred "true or false" questions. Assuming that the inaccurate question count represents an effort to speak in round numbers, it is nevertheless troubling that the reviewer did not realize that the statements were of the "disagree or agree" type, not "true or false." While the difference might seem trivial to laypeople, graduate students, and even some practicing professionals, it is important in determining personality factors and in influencing actual outcomes.

In summary, *The Sales Edge* offers a comprehensive, effective, expert-systems approach to day-to-day sales opportunities. It gives a customer-specific strategy based on the collection of human factors and sales techniques tailored for individuals involved in specific sales situations. The vast amount of accurate sales strategy information contained in *The Sales Edge* has been carefully developed. It is unfortunate that Dr. Spezzano wasn't as careful or as knowledgeable in his review.

We thank Dr. Spezzano for his comments. Clearly, with innovation comes controversy.

—James Johnson, Ph.D.

G. . . but make him think he sold himself. Move your presentation along at a quick pace.

2. RESOLVE HIS OBJECTIONS AND CLOSE THE SALE

Mr. G. . . will express his concerns and objections freely. Overcome objections, but avoid soliciting additional objections. This will allow Mr. G. . . to shape the direction of your meeting, and also give him the freedom to make a quick decision to buy.

RESPONDING TO OBJECTIONS

Mr. . . 's objections. Tell him that you understand his technical reports to support your position, but does not contradict Mr. G. . . 's position. When possible, your arguments in such a way that he asked for.

Now for the nitty-gritty. Sales Edge sets up the close; which is what the program's all about.

Dr. Spezzano replies:

I have no trouble acknowledging my total lack of familiarity with "expert systems." I was asked to review the program from the standpoint of a psychologist and I did so. Dr. Johnson, however, makes the error in logic of assuming that since the program was based on expert-systems theories and was not intended as a tool for psychological analysis, it has no psychological dimension. That's the equivalent of the poet calling an interpretation of his poem wrong because it doesn't correspond to the conscious intentions he had in writing it.

Whether or not Dr. Johnson *et al.* deliberately set about to create a "mere tool for psychological analysis," their system of analysis predicts how a person will respond to a certain interpersonal style, under what circumstances a person will feel comfortable or defensive, and whether or not a particular person "tends to be tense and apprehensive and is sensitive to minor slights." Any system that engages in such predictions has slipped into psychological analysis, whether that was the system designers' intention or not. Having entered that realm, the system is then open to questions of psychological validity. In this context, Dr. Johnson still did not explain the basis for his program's prediction, say, that a particular person will be tense and apprehensive, or any similar *personality* analysis.

It's not unfair to ask for the research that demonstrates the correlation. Dr. Johnson's reply that

the development of *The Sales Edge* "was based on the experience and knowledge of experts along with hundreds of research publications and interviews" is inadequate. I suppose he might respond that the question is inappropriate, his program is not a psychological tool, but I'll ask it anyway and continue to assert its relevance.

Dr. Johnson insists that *The Sales Edge* is designed simply and humanistically to facilitate a positive interaction between a buyer and a seller to promote an atmosphere conducive to increasing sales. I doubt if this statement would convince *Consumer Reports* to fold up shop and go home because consumers could now trust completely in the good intentions of the seller.

I fully agree with Dr. Johnson's objection that I was facile in calling his "agree-disagree" procedure a "true-false" procedure. Still, I'm not sure how Mr. Johnson misunderstood my review on as many counts as he feels I misunderstood his program. Maybe we should run a *Sales Edge* check on each other before trying to communicate again.

Actually, I ended up feeling that many salespeople might want to use *The Sales Edge* to generate thought-provoking hypotheses about a particular sales situation, and that the program might make most salespeople more thoughtful about the interpersonal aspects of their work. However, I'm still not convinced it does that by supplying proven (by research) analyses of their customers. —Charles Spezzano, Ph.D.

END



No publication in this industry (ours included) is able to cover everything or help everyone answer the questions that come up — too many vendors offering too much equipment and software and too much variety in computer owners.

We receive about 100 magazines regularly and spend a lot of research time and dollars scanning them to find supportive information. It may be useful to your research to know which of these seem most useful to members of our staff and our associates.

We surveyed these people and asked "which magazines would you recommend to neophyte, intermediate or advanced personal computer owners? Which do you read to keep track of the computer industry or for special computing interests?" The results (with the number of people recommending each magazine in parentheses) and some comments follow:

NEOPHYTE:

- Popular Computing (6)
- Personal Computing (3)
- SofTalk (2)
- Family Computing (1)
- Enter (1)

INTERMEDIATE:

- BYTE (5)
- PC World (2)
- Creative Computing (2)
- PC (1)
- Apple Orchard (1)

ADVANCED:

- Mini-Micro Systems (2)
- Electronics (1)
- Microsystems (1)
- Programmers Journal (1)
- Call-A.P.P.L.E. (1)

COMPUTER INDUSTRY:

- InfoWorld (9)
- Computer Merchandising (1)
- Weekly Marketing Bulletin (1)
- Wall Street Journal (1)
- RELEase 1.0 (1)

SPECIAL INTERESTS:

Portable 100 — Radio Shack 100 portable Personal Computer World; **SOFT** — what's going on in the U.K./Europe.

Classroom Computer; Learning; Electronic Learning — computing in education.

Teleconnect — telecommunications.

Nibble — Apple program listings.

Computer Shopper — for mail-order manics and used computer equipment

Advertising Age; Business Week; High Technology — different views of the computer business.

The SPCU Letter — in-depth analysis of IBM PC writing and organizing software.

POPULAR COMPUTING —
"The first place to send a friend who wants to understand a bit about computers. Clearly written, non-technical features and a good 'Ask Popular' column answering basic questions."
—Dan Dorenberg/Rachel Unkefer

PERSONAL COMPUTING —
"Because it's sold in most super-markets, giving the curious an easy in."
—Louis Jaffe

SOFTALK — "Wide range and good balance of subjects. The 'Beginners Corner' and 'System Notebook' sec-

tions are the clearest technical writing I've seen."
—Richard Wanderman

FAMILY COMPUTING — "For home-computer-considerers I recommend some time with this before they make any serious buys. It's the publication with the most realistic but still inviting reports on what personal computers might actually be good for in the home. Nice array of software reviews, too."
—Stewart Brand

BYTE — "THE reference book. Accurate information in depth."
—Barbara Robertson

ACCESS INFORMATION

ADVERTISING AGE: \$52/year (52 issues); Circulation Dept., 740 North Rush Street, Chicago, IL 60611. **APPLE ORCHARD:** \$24/year in U.S., \$30/year foreign (12 issues); PO. Box 6502, Cupertino, CA 95015. **BUSINESS WEEK:** \$39.95/year (52 issues); McGraw-Hill, PO. Box 506, Hightstown, NJ 08520. **BYTE:** \$21/year (12 issues); PO. Box 590, Martinsville, NJ 08836. **CALL A.P.P.L.E.:** \$25 membership plus \$26 annual dues (you must be a member to receive); 12 issues; 21246 68th Ave. South, Kent, WA 98032. **CLASSROOM COMPUTER LEARNING:** \$19.95/year (12 issues); \$38 two years; \$55 three years; 5615 West Cermak Road, Cicero, IL 60650. **COMPUTER MERCHANDISING:** \$30/year in U.S., \$75/year foreign (12 issues); 15720 Ventura Blvd., Suite 222, Encino, CA 91436. **COMPUTER SHOPPER:** \$15/year (12 issues); \$1.95/issue; 407 S. Washington Ave., PO. Box F, Titusville, FL 32781-9990. **CREATIVE COMPUTING:** \$24.97/year in U.S., \$34.97/year foreign (12 issues); PO. Box 5214, Boulder, CO 80321; (800) 631-8112 for subscriptions. **ELECTRONIC LEARNING:** \$19/year (8 issues); Electronic Learning, Scholastic, Inc., 902 Sylvan Ave., PO. Box 2001, Englewood Cliffs, NJ 07632. **ELECTRONICS:** \$24/year (26 issues); PO. Box 514, Hightstown, NJ 08520. **ENTER:** \$14.95/year (10 issues); One Disk Drive, PO. Box 2686, Boulder, CO 80322. **FAMILY COMPUTING:** \$17.95/year (12 issues); PO. Box 2512, Boulder, CO 80321. **HIGH TECHNOLOGY:** \$21/year in U.S., \$26/year in Canada, \$30/year foreign (12 issues); PO. Box 2808, Boulder, CO 80321. **INFOMATICS WEEKLY MARKETING BULLETIN:** £120/year (52 issues); Subscription Manager, VNU Business Publications BV, 53-55 Frith Street, London W1A 2HG. **INFOWORLD:** \$31/year (50 issues); 375 Cochrane Road, Framingham, MA 01701; (800) 343-6474. **MICROSYSTEMS:** \$26.97/year (12 issues); PO. Box 2930, Boulder, CO 80321; (800) 631-8112. **MINI-MICRO SYSTEMS:** \$45/year (14 issues); free to corporate managers and engineers who qualify (criteria not specified); PO. Box 5051, Denver, CO 80217. **NIBBLE:** \$19.95/year (8 issues); PO. Box 325, Lincoln, MA 01773. **OPEN SYSTEMS: Managing Office Technology:** \$135/year in U.S., \$165/year foreign (16 issues); PO. Box 1231, Stamford, CT 06904. **PC: The Independent Guide to IBM Personal Computers:** \$26.97/year (12 issues); PC Magazine, PO. Box 2445, Boulder, CO 80321. **PC WORLD:** \$24/year (12 issues); Subscription Dept., PO. Box 6700, Bergenfield, NJ 07621. **PERSONAL COMPUTER WORLD:** £12.50/year in U.K., £27.50/year overseas (12 issues); James Stuart Cruickshank, 53 Frith St., London W1A 2HG. **PERSONAL COMPUTING:** \$18/year (12 issues); PO. Box 2941, Boulder, CO 80321. **POPULAR COMPUTING:** \$15/year (12 issues); \$2.50/issue; PO. Box 307, Martinsville, NJ 08836. **PORTABLE 100:** \$28/year in U.S., \$38/year foreign (12 issues); PO. Box 468, Hasbrouck Heights, NJ 07604. **PROGRAMMER'S JOURNAL:** \$24/year (6 issues); PO. Box 5070, Eugene, OR 97405. **RELEASE 1.0:** \$395/year (semi-monthly); 200 Park Ave. Suite 2715, New York, NY 10166. **SOFT:** £12 U.K., £25 overseas (12 issues); Soft Subscription Dept., Freepost 7, London W1E 4EZ. **SOFTALK for the IBM Personal Computer:** \$18/year (12 issues); free to IBM PC owners; Softtalk/IBM Circulation, PO. Box 60, North Hollywood, CA 91603. **SOFTALK for the Apple:** \$18/year (12 issues); Softtalk/Apple Circulation, PO. Box 60, North Hollywood, CA 91603. **THE SPCU LETTER:** \$36/year (12 issues); The Society for Prevention of Cruelty to Users, 6716B East Cedar Avenue, Denver, CO 80224. **TELECONNECT:** \$15/year (12 issues); 205 W. 19th St., New York, NY 10011. **WALL STREET JOURNAL:** \$101/year (daily except Saturday and Sunday); 200 Burnett Road, Chicopee, MA 01021. **WEEKLY MARKETING BULLETIN:** £120/year (52 issues); VNU Business Publications BV, 53-55 Frith Street, London W1A 2HG, England.

PC WORLD — "Has good general information on what's going on, not just for IBM."

—Matthew McClure

MINI-MICRO SYSTEMS — "Many articles on specific technologies that are important; hi-tech, but readable."

—Richard Dalton

ELECTRONICS — "Covers basic electronic technology and the industry it supports. Strong technical staff in New York and its own reporters throughout the U.S. and in Europe and Japan."

—Cliff Barney

CALL-A.P.P.L.E. — "Best magazine

for technical information about Apple computers."

—Woody Liswood

INFOWORLD — "I regard it as the NATIONAL ENQUIRER of computing."

—Alan Kay

"Yeah, well, hmm, grumble. Used to be indispensable. The jury's out on the new INFOWORLD (minus many of its former reporters). Still has the best columnists."

—Art Kleiner

"INFOWORLD's the only one I read all the time. I hate to say it because they panned me three times now. It's the only one with news that's current."

—Peter McWilliams

NEWSLETTERS — FOR SPECIAL SITUATIONS

The best newsletters offer compressed information and are usually imbued with a heavy dose of the writer/ editor's personality. Having written one for the last four years (*OPEN SYSTEMS: MANAGING OFFICE TECHNOLOGY*), it seems that readers value the unusual nooks and crannies where you mine information, and the trust that develops for a writer's judgment.

You can also cut your own research time down if you find a newsletter that digests all the pounds of paper and gives you a succinct look at what it all means, but expect to pay a premium — up to \$50/year for a consumer-targeted newsletter and \$200 (or more) if a newsletter's designed for the corporate world. Very expensive information; some-

times well worth the cost.

THE SPCU LETTER is written and edited by *REVIEW* contributing editor Charles Spezzano. Full of pith and vinegar, the newsletter names names. A recent editorial took computer magazines to task for poor software reviews. Complaining of inflated praise for ordinary programs, it cited *PC WORLD*'s review that concluded with this dainty piece of hyperbole, "almost everything about MULTIMATE is new and miles ahead of the competition." *THE SPCU LETTER* specializes in IBM PC word processing and data management programs and does research software with the aid of The Society for Prevention of Cruelty to Users, a 600 member international organization.

WEEKLY MARKETING

BULLETIN comes from England and though it arrives about 10 days late, still contains more real news and intriguing industry gossip than any U.S. publication I've seen. Expensive at about \$180/year (dependent on the current exchange rate), but it's fairly amazing how the clever Brits behind the publication stay so far in front; so far away. —RD

My favorite read is *RELease 1.0*, a pricey monthly newsletter from Esther Dyson, who writes with more intelligence per column inch than anyone else in the business — and with a high quaint humor. This sharp-eyed daughter of physicist Freeman Dyson treats the biz like a good field biologist might. She observes acutely, notes trends early, predicts boldly, and retains a wicked remote fondness for her obligingly complex subject. —SB



Artificial intelligence is becoming a buzzword in the software circus, more grist for the magnificent hype machine. AI techniques are indeed creeping into the software now on the market. English-language recognition is one example; expert systems such as The Sales Edge (see p. 108) are another. As machines become more powerful and less expensive, AI will subtly slip more and more into our consciousness.

Today's AI research will directly affect our lives in the future. Robotics and automation will no doubt have their effect on economics, certainly a major concern. But the raw brainpower of the computational systems just over the horizon raises difficult questions about society, and about humanity itself: to what extent are we quantifiable, and therefore replaceable by computation?

To get some perspective on these questions, I interviewed Nils J. Nilsson, Director of the Artificial Intelligence Laboratory at SRI International in Menlo Park, CA. Dr. Nilsson has written several books on AI, the most recent of which is Principles of Artificial Intelligence. In some ways, the questions AI researchers are trying to answer are simple — any ten-year-old might be able to answer them. But would the ten-year-olds know how they got the answer? Does a spider know how it spins its web? —Matthew McClure

REPLACED BY A COMPUTER?

An Interview With Nils Nilsson


Q. Why do you think the average person would be interested in the whole idea of artificial intelligence?

A. Artificial intelligence research produces models to help us think of ourselves in ways that are more precise, or at least different, than we have in the past. That may well cause us to have as profoundly different a view of ourselves as did, for example, the advances in the theory of evolution or other sorts of paradigm-shifting intellectual

events. My view is that AI is going to change the way we look at ourselves.

Q. Is this because knowledge engineers will make people who are already experts have to think more cogently about what constitutes their expertise?

A. That's another effect, and I think it's quite analogous to the effect that the invention of mathematics had on some of the physical sciences, say physics, for example.



Nils Nilsson,
Director of SRI
International's
Artificial Intelligence
Laboratory.

Calculus and other mathematical inventions gave scientists new intellectual tools that made them think more precisely and more concisely, let them pose questions and frame theories much richer than they would have been able to do in just English or Latin or whatever it was that they thought in before these tools were invented. I think the same is true in a lot of other subject areas where classical mathematics, differential equations and so forth, haven't been as useful as more qualitative kinds of thinking done in English. I don't mean only in the soft social sciences, but even in geology.

AI and widespread use of computers will have a dramatic effect on our future. Alan Newell, of Carnegie-Mellon University, predicts that we will one day live in a fairy land of computation, where there are sorcerer's apprentices around helping us do everything, street lights that light up when we walk under them because they know we're there. Not only that, but they'll give you directions if you're lost, and so on. Computation will be scattered everywhere, in every nook and cranny in the world, and it will be helpful computation: traffic lights won't make you wait if there's nobody else coming, and so on.

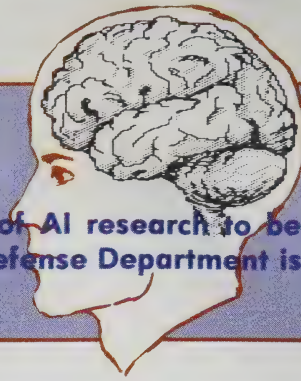
Q. What are the main areas of research in artificial intelligence?

A. One of the earliest is visual pattern recognition — printed characters, optical characters. Vision is certainly an important area.

Natural language processing is another. Usually, "processing" includes both *understanding* English sentences, say, or any other language, and *generation* of those sentences. The field also includes specific attempts to recognize or generate speech. But most of the work that's being done at the moment assumes that the input is typed, say, onto a screen, and the output is also typed. Even there, the problem is pretty tough, even if you know what the words are. With speech, you have the additional problem of deciding what the words are, where the segments are and so on.

Expert systems have to deal with the application of reasoning methods to specific practical problems. Very often they involve reasoning techniques in which you have to deal with knowledge that is not certain. Much of the expert systems work involves special techniques for being able to say that a piece of knowledge is only 50% probable, or 80% or 90%, and then determining what the logical conclusion would be.

Another area of AI is planning.



I consider a lot of AI research to be rather benign, although the Defense Department is supporting it.

Sometimes it's a bit difficult to separate that from the expert systems work, but there are some specific kinds of reasoning that involve reasoning about actions.

The technical apparatus of AI underlying those subjects might well in fact be common. There are ways of representing knowledge that are not only used in vision, but also in natural language, planning and expert systems.

Q. I know most of your research is more or less "pure" AI; do you do any work related to the military?

A. Yes. Most of the basic research in AI in the country has been and I think will continue to be supported by the Defense Department.

Q. Is that mostly ARPA [the Defense Department's Advanced Projects Research Agency]?

A. ARPA. Yes. In fact, I think AI research has progressed as far as it has in this country because of ARPA funding. The National Science Foundation just didn't have the kind of money that was required to create these AI laboratories, here, at M.I.T., Stanford, and so on. To my knowledge, and certainly here at SRI, that research is rather benign, although the Defense Department is supporting it. It's at such a basic level that most of it doesn't really engage any particular application yet. Even those of us who are somewhat concerned about the use of AI in military settings feel that what's important, really, is how many choices there are left after the research is finished. Many of us

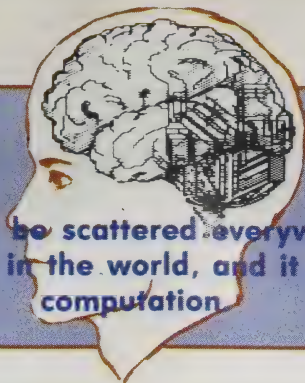
would not work on a project to develop mustard gas, because there's so little else to do with it after you make it; but we may well work on basic molecular valence theory, which certainly could be used in making chemical munitions, but also can be used for many other things.

In my laboratory, everything we do we can publish. We insist on being able to publish. The product of our research is largely papers submitted to professional journals, some of them international journals, and international conferences.

Q. We hear a lot about the Japanese AI research and their "fifth generation" projects. Are there any large-scale AI development schemes in the U.S. similar to the effort in Japan?

A. The Japanese companies who are allied in the fifth generation project will end up producing the personal computers of the future, allowing us to use much more complex programs than the word processors and spreadsheets of today. We'll have programs using principles of AI which require tremendous computing power, and it looks to me like the Japanese have a good chance of being the people who will provide that power. Other companies in this country may also. I'm not saying the Japanese are necessarily going to blow us out of the water, but they'll be successful entries in the race.

There are various flurries of activity here and there. ARPA has just announced its strategic com-



Computation will be scattered everywhere, in every nook and cranny in the world, and it will be helpful computation.

puting project, which will involve spending something like fifty million dollars the first year, growing to a few hundred million per year. But they aren't going to set up any kind of institute like Japan's.

Another attempt is the Microelectronics and Computer Technology Corporation, MCC, which is an affiliation of several non-IBM computer companies — DEC, Honeywell, some others — to create a new institute very much like the Japanese, in Austin, Texas, headed by an ex-National Security Agency director, Admiral Bobby Inman. Companies will be sending employees there much like many of the Japanese companies do to the ICOT project. The companies will give MCC money, and they'll have a budget close to a hundred million dollars a year, also.

There is a new institute at Stanford called the Center for the Study of Language and Information that was funded by a grant from the Systems Development Foundation. It brings together a large number of people, from linguistics, philosophy, computer science. Their funding amounts to some \$20 million or so, over four years, and it will probably be renewed. So it's large even considering ARPA projects. The nice thing about it is they don't have to build any particular system that meets any particular specifications to be delivered. It's a full-out attempt to do basic research.

Q. Do you agree with Newell's vision of the intelligent traffic lights? Are

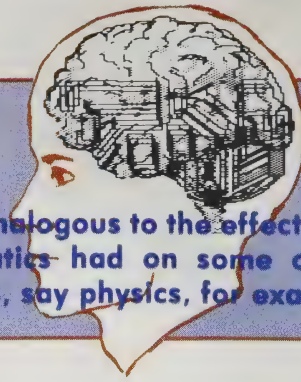
urban planners taking an interest in that kind of research? I understand that in Amsterdam, they have automatic trash cans: you throw your litter in the can and it tells you a joke.

A. Really? Japan has a lot of that, too. There are traffic lights for the blind that beep one way when the light's okay to cross. A lot of that can be done; it's not necessarily AI, it's just applying the knowledge we have at hand in a useful way.

About the time we wanted to get the PROSPECTOR project launched for giving advice to geologists about mineral projects, we thought we would try another project, applying expert systems to crop and pest management. At the time, the Environmental Protection Agency was a little stronger, and we were trying to sell it to them on the grounds that if you were intelligent about pest management you wouldn't use as much pesticide; you would recognize that a particular bug had already passed the point where it could do damage to a crop. They were interested, but the U.S. Department of Agriculture seemed to be of the opinion that it was too humorous for words, so it didn't happen.

Q. What kind of problems is your group working on now?

A. One interesting problem is the design of several robots — not just one robot, but several. With only one robot, it will have to know about properties of the physical world, since it has to move around; it also has to know what kinds of actions it is capable of so it can do



I think it's quite analogous to the effect that the invention of mathematics had on some of the physical sciences, say physics, for example.

reasoning to decide what actions to perform to achieve a certain goal. For several robots to communicate and cooperate, each of them, in addition to knowing about things in the physical world, will need to know about the other robots — not only their location, size, and all that, but what these other robots *know*: a model of their cognitive state. That's teaching us a lot about human language, too, because humans use those kinds of processes a lot in understanding themselves when they're speaking.

Q. *What do you think about the economics of AI and automation?*

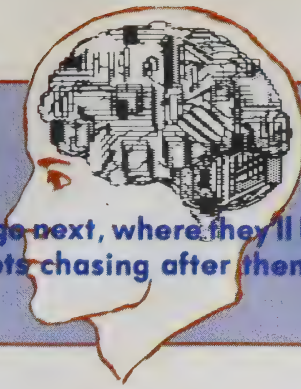
A. That's a difficult question. Many people think that AI, robotics and automation are much like any other kind of technological development. Technological developments in the past have always caused some people to say they were going to lead to unemployment. In most cases there has been some dislocation, which might be quite serious for the people experiencing it, but in the long run at least, employment has increased. People point out that societies which have comparatively little automation — Paraguay, Mexico, India — have more unemployment than we do. These new technologies will, they say, create new jobs, new industries — so not to worry.

If you're a welder on an assembly line, you *should* worry, and I don't know that anyone can say what those people should learn for the jobs of the future; but nevertheless, many economists, Nobel prizewin-

ners and so forth, can pretty much prove to you that there is not going to be a long-range unemployment problem caused by automation.

I think they're wrong, actually, and you can also find Nobel prize-winning economists who agree with me. One with whom I've talked quite a bit is Wassily Leontief. I think they're wrong because AI is qualitatively different from these other things. They say, well, everybody who has a new technology thinks it's qualitatively different; what's so special about you? But the goals of AI are so grandiose — to be able to do anything that humans can do — that these new jobs that are going to be created could equally well be performed by automatic devices also. If you really literally can do anything that humans can do, and can do it more cheaply, then, if we're still involved with some sort of free-enterprise system, the people who are now paying humans to do these things will try to make more money by buying chips to do them, instead.

I think you can make a pretty good economic argument, and Leontief agrees, that if you believe that AI is all that special, in the long run it will probably keep chasing people from wherever they decide to light. As robots moved into manufacturing, we geared up our economy to services and scratching each other's backs became our way of distributing money. Now computers are chasing us out of that niche. A lot of computer programs will be able



Where do people go next, where they'll be safe from the robots chasing after them?

to perform service functions. Then comes the question, where do people go next, where will they be safe from the robots chasing after them?

Q. You qualified what you were saying with, "If we're still in a free-enterprise economy." It reminds me of Bucky Fuller's idea that the idea of earning a living is outmoded. As AI becomes more commonplace, your living will be earned and you can go play your lute under a tree.

A. That's why I don't see the possibility of machines doing these things as being necessarily bad. If many people, in order to gain their livelihood, now have to do things that they don't want to do — dumb things, tedious, and dangerous — then how can it be regarded as bad to have machines do those things? It's bad because we haven't figured out a good economic system to deal with it.

There are certainly all kinds of activities that humans can be involved in that they find rewarding. They don't necessarily have to be coupled to income. Now there are some serious transition problems. We're not there yet. How do we get there? How do we do it in such a way that people aren't unduly hurt by unemployment dislocation and so on? Unfortunately, it seems to me, our national outlook on helping people seems to be at a low state. We're experimenting with a return to the nineteenth century, and I hope we grow out of it.

Q. Do you think computers will tend to widen the gap between the rich

and the poor? As information becomes the medium of economic exchange, won't the people who have access to information and know how to manipulate it gain wealth?

A. I think there's a real danger there, but I don't think it can be wholly laid to computers. I think there's something larger than that going on now, that would be going on even if it weren't for computers. That is a splitting of the country into two sections. There's the civilization you can be part of if you have money: medicine, schools — more and more trends toward private schools, with the public schools getting worse — the post office, where if you really want something to get there you use Federal Express, rather than the pedestrian postal system. The more the wealthy and powerful people are involved in their own system, the less their voices will be heard in trying to make the other system work right. The other systems are largely for the poor — Medicare, the ordinary post office, the ordinary roads and schools. I think this trend is getting a little bit worse now. And computers will certainly be on the side of the private one, as things are going now.

END

The American Association for Artificial Intelligence (AAAI) is the scientific society for the AI community in the United States. It sponsors or co-sponsors annual AI conferences, and produces a publication devoted to artificial intelligence, THE AI MAGAZINE. For more information, contact: American Association for Artificial Intelligence, 445 Burgess Drive, Menlo Park, CA 94025.

Is It Stealing?



James Donnelly

This is one of software's perennial issues. Programs are generally copyrighted by their authors and most are distributed with a written notice that they are not to be duplicated. Yet unauthorized copying of programs continues — called "piracy" by software users and sometimes "theft" by software developers.

We see two questions here: Should the program's author receive appropriate compensation for his or her efforts? And how are personal ethics to be resolved in agreeing not to duplicate a program (as a condition of buying it) and then handing a copy to a friend?

Economics are a big factor. With programs costing \$200 to \$1000, temptations to "share the wealth" are high. Software developers recognize this and devise ever more clever schemes to defeat pirates who respond in turn with new ways to get around these schemes.

I'm personally opposed to piracy based on economic gain: say, a business that buys one copy of a program and passes copies around to 20 PC users in the organization or a company that's set up to rip off the distributor (and make its own profit off the transaction).

The personal issue is just that. We've gathered some industry viewpoints, comments from software owners and responses of people associated with the Society for Prevention of Cruelty to Users that show a number of sides to this question. These won't answer the question whether piracy is right or wrong. Thankfully, that issue is still left to each of us.

—RD

A Software Developer's Viewpoint

Gerald C. Diamond
Vice President, VisiCorp

We believe that the most appropriate term to describe what we're talking about is "stealing software." In essence, that's what people are doing: not paying for software, like shoplifting. We obviously consider that serious. We have found that the business user, by and large, has a high level of integrity and is reluctant to steal software. That user is looking for all the levels of support we can supply — technical support, backups and replacements, upgrades and so on.

There are probably far fewer instances of software stealing in that segment of the market than with entertainment and education software.

We are doing two things. First, we're copy-protecting our software. We recognize that there is no 100% foolproof method for doing so, but we have progressed in making it more difficult for people to steal our software. Obviously, we also use the laws to protect our rights. Typically, what happens if we find someone stealing software on a commercial basis — copying and reselling — we will write a letter saying, "What you are doing is illegal and we'd appreciate it if you'd stop."

In almost every case, people have stopped. In a couple of cases we've had to take legal action.

One of those was in West Germany, where a company was blatantly stealing and selling software. The West German court decided we were right and issued a court order stopping distribution of stolen software; there will be a payment due to us. The company has appealed, so it's not totally final. We have not sued anyone in the U.S.

We use some generalized protection schemes. In some cases it's simply encrypting the software. In other cases the software reads a serial number on the machine and will operate only on that machine.

One possible solution (?) is to consider it a complete waste of time to copyright a piece of software with regard to *any* reproduction for profit. Granted, the issue of reproduction for profit is a repugnant one that should be addressed. On the other hand, reproduction for person-to-person is impossible to stop and should be handled differently.

One way to discourage wholesale piracy might be to refuse support by the authoring individual or group to anyone without a valid ownership license. In the case of business software users, the issue of support becomes very important in updating packages. —Tom Spence

Buy a backup diskette if you intend to use our software on several machines. We're just beginning to address the problem of hard disks with multiple users. So far, we've said there is no reason why the user can't use one of our products on a network. For example, we have worked with 3COM to make *VisiCalc IV* and *VisiWord* available on the 3COM networks. We've developed three network variations, each for a different service. So, for example, one server may have a capacity for 2 to 4 users; another may plan for

3 to 10. We're not interested in trying to count the number of users. For the smaller server, the cost will be, say, twice that of the single user; for the larger server, three times. That approach has worked very well.

Companies obviously don't condone stealing software. We would have no objection to a company establishing a library of software for its people to try out before purchasing a program. That's one approach.

We have a very small legal department.

Skull and Crossbones Flying High

Charles Spezzano

No sense in being coy. Here's the punchline. Software piracy doesn't exist.

Stop snickering. I don't mean to say that people aren't making copies of their favorite word processors for their best friends. In fact, my survey of 25 SPCUers chosen at random suggests that not only does almost everyone do it, but everyone thinks that almost everyone does it. What I do mean is that no one seems to think they are doing anything as serious as the word "piracy" implies.

What most of them believe they are doing is "xeroxing," and that's an innocuous little piece of larceny we've all engaged in for decades. Very few of us flinch at the thought of copying a chapter from a library book for a class, even though it's illegal. None of us hides in the hills waiting for the statute of limitations to run out after taping a record we enjoyed at a friend's house. In fact, my local supermarket now has a coin-operated cassette copying

machine near the entrance. And what about the recent Betamax decision?

But, I reminded this band of outlaws, you are stealing a \$400 or \$500 item when you copy software. In one form or another, the most frequent answers all implied that no one can resonate to the price of a software package. Few people think there's a logical reason for pricing a program on a \$2 diskette, accompanied by a \$30 manual, at \$500. So that inhibition

is not having much impact.

Ironically, despite the fact that most people appear to have a hole in their conscience just large enough for a diskette to fit through, the average pirate doesn't indulge this habit all that often. Only four people had gone the whole route of copying a disk, xeroxing the key pages of the manual, and regularly using a stolen program. Most occasionally exchanged programs with a friend.

Here are the three most typical scenarios for those exchanges:

1. Tom tells Fred about a new game or word processor that he just bought. Fred has no intention of buying it but Tom offers to make a copy and Fred accepts. He tries it for a while and puts it on the shelf, or likes it better than his word processor and wants the manual, and so buys the package as cheaply as he can from a mail order house.

2. Mary just bought a new PC and has no idea what software to get for it. Ted tells her he's been using a pretty good word processor that's gotten some good reviews. He makes a copy for her and shows her how to use it for the kind of letters and reports she does most often. He coaches her to the point where she can do most of what she needs to do, so she never buys the manual or learns the other advanced

features, unless it's a program like *WordStar*, in which case she buys Arthur Naiman's book instead of the manual, and is better off than Ted. Six months later, she reads that MicroPro has upgraded *WordStar* to version 22.76, so she buys the new version.

3. Bob decides to get the same computer for his home that he uses at the office. He's going to do a little moonlighting as a technical writer. He makes a copy of the word processor he's been using at work and takes it home.

Hearing these scenarios described reminded me of a point made by Herbert Swartz, lawyer and writer for several computer magazines. He said he didn't buy the argument that people are inherently sociopathic and will rip off anything they can get away with. For the most part, they demonstrate a natural wisdom, not an unnatural perversion, in actions like copying software. It's the vendors who persist in trying to force unrealistic licensing agreements on consumers, even when it doesn't look that way.

The pirates I interviewed were not in the habit of taking a new program to their user's club meetings and making copies for everyone with a blank disk. They often bought programs they originally received in pirated form, so the pirating served as free advertising for the companies. They

Who is copying programs? I have run across more than one otherwise responsible adult who is hooked on illicitly acquiring a copy of every commercial program available for a personal computer. The most extreme case is a high school teacher hereabouts who must have a thousand Apple programs. It's a peculiar kind of collector's frenzy, laughable really, because he doesn't have any documentation for these programs and doesn't have any idea how to use most of them. But he's got 'em on disk, he's got 'em!

—Louis I. Jaffe

uniformly agreed that selling a copy of a program to someone is illegal and should be illegal.

Eighty percent sympathized with software publishers who sue "software rental agencies" on the assumption that no one is going to rent *WordStar* for a week for a hundred dollars just to see if they like it, unless they plan to make a copy.

Sociologist Amatai Etzioni has argued that when the proportion of the population violating a law approaches one-third, the law begins to lose its psychological hold on people. It doesn't "feel" like a real law, so people begin to think that no one else is taking it seriously and they stop doing so too. My small survey strongly suggests that software copying has joined xeroxing in that category and that legislating against it is

not likely to stamp it out. It's not even clear that copying always takes money out of the vendor's pocket. In some cases it might create new customers who would never purchase the program until they had used it for a month and really knew they liked it.

That, in itself, raises a final point. Software is the most invisible major purchase most consumers will make. Unless potential buyers come to trust the recommendations of particular reviewers or magazines — to the degree they often trust the reviews of vacuum cleaners in *Consumer Reports* — they will be reluctant to buy a new program without living with it for a while, and pirating offers one of the few ways to do that.

Like it or not, the diskette with skull and crossbones is here to stay.

Piracy and Backup in the Fortune 1000

Pat Reilly, President, BASIC 4

MAI is a 28-year-old company which got into the minicomputer business before my time. Our software is like most people's software: if you get a copy, there's not much to keep you from copying it. Our legal department would like it to be that if you sold to A, only A could use it. There are a variety of ways of encrypting software so it can't be copied or reused, but all fly in the face of that daily task of people who buy computers for business accounting: backing up their work. Making a backup is the first thing we teach every user. That backup copy, of course, can be used by anyone else.

There are several approaches to protection. First, through a variety of techniques, you can try to prevent users from copying a

program. A second possibility is the mating of the software so it only runs on a specific piece of hardware. The problem with the

first is if you protect the disk, then the user can't make backups; the other scheme prohibits the use of multiple computers, or running on another computer should the first machine fail. The majority of our software today can be copied, and is not locked to a specific machine.

As the sophistication of the software goes down, the inclination to misappropriate that software goes up. If the software is so sophisticated that you need support for it — fixing bugs, upgrades and enhancements — then the value of buying it exceeds the potential for stealing it. We are less vulnerable than someone with a product like *VisiCalc*. Estimates that I've seen suggest that for every software copy purchased from VisiCorp, there are 1.5 to 2.5 copied versions in the field. Our experience is in the 10 to 50 percent range.

Our legal department worries a lot about software protection. Folks there hope some kind of magic exists that will move the legal defense to a hardware defense. We are pursuing lawsuits that could cost 100 times as much as the amount at stake, but if you don't vigorously defend your copyright, it lapses into the public domain.

No software protection

scheme will universally beat everybody but as the sophistication of such schemes accelerates, the number of people able to break them decreases. We have one piece of software that we went to great lengths to make uncopyable. The software copies, but it won't execute. To my knowledge, nobody has broken that. But certainly someone could, particularly with fancier equipment.

One interesting situation involves machines on networks, where software resides centrally and multiple terminals access it. Our provision has always been that you could use software on as many terminals as you have connected, but many other companies don't allow that. They believe that if fifty users are on the network, each one ought to buy a copy of the software, but I don't think anybody does that.

McDonnell-Douglas takes a novel approach. That company has hundreds of users with, for example, IBM PCs on their desks. For many programs, the company buys one copy and only one and keeps it in a library, not on anyone's desk. In no instance are any two users getting simultaneous use out of the package. Although no software house's contract encourages or permits that use, I think they should. I don't think

Software piracy just brings already contradictory issues into sharper focus. If information is not free, what are public libraries? And what's to prevent a public library from lending software? Philosophically, if you allow a library to lend books, how can you prevent it from lending software? And thus what will prevent people from making copies? (I suppose the computer equivalent of public libraries are public domain bulletin boards, but they aren't state-supported and they're limited in what they can offer.)

I'm somewhat ambivalent about this issue, but I can't feel too morally justified in condemning piracy.

—Art Kleiner

McDonnell-Douglas is being unethical; I believe they've bent over backwards to do the right thing.

We made a survey recently, asking software companies what their policies were on product protection. About half said they recognized it as an issue, but

didn't have a policy. MicroPro uses a square root formula; at least they have policies on it. Lotus, for example, has no policy; they'd have you buy a separate package for each user. What happens, I suspect, is that a lot of people ignore that wishful stance.

Gentlemen may cry, "Peace, peace!" but there is no peace. Please tell me what ethics are. The only ones I know about are the ones that come in the mail from associations and societies I pay dues to from time to time.

In the state I live in it used to be "unethical" for civil engineering firms to bid against each other for highway and other contracts. Now it is a violation of statute for the engineers to follow their ethics.

Most of the software I have ever handled is accompanied by a lot of fine print alleging that by using the program — or by previously having torn open the cellophane wrapper — I have consented to a "licensing agreement." This stipulates, usually, that I will use the disk on my own computer only and will notify the vendor and relicense my program if I change computers.

Yes, an ethical question is being raised when I read that. *Those lying sons of bitches and their California lawyers are trying to con me and every other God-fearing patriot out of our rights as Americans — namely, the copyright doctrine of "fair use."*

One inexpensive program I own has the common decency (I would even say "ethics" if I thought computerdom were a seasoned enough world to permit use of that word) to tell the truth about the issue.

This software and manual are both protected by U.S. copyright law (Title 17 United States Code). Unauthorized reproduction and/or sales may result in imprisonment of up to one year and fines up to \$10,000 (17 USC 506). Copyright infringers may also be subject to civil liability.

The law is a reasoned and collective judgment on the balancing of fair play between copyright owners and their customers. Software houses that feel the law compromises their interests can write copy-protect schemes into their programs and hope to overcome the negative psychological effects those schemes have in the marketplace. Customers have every right to break the copy-protection so long as they keep within the "fair use" rights provided them by Congress.

I suppose we can say from experience that users copying programs for their friends know that they are violating copyright and do so because they are sure they won't be caught. The software houses have lawyers to tell them that the "licensing agreements" are mendacious bluster. Neither of the parties is dripping with slime. It's just that the vendors are being consciously cynical (if legitimately self-protective), and the copiers feel guilty even when they are fairly exercising their rights of limited ownership.

—Alfred Lee

"Gossip" is back-of-the-book odds and ends about the process of getting this magazine out. The personalities behind the stratagems, behind the opinions, behind the inky labor of magazine-making. There's nothing whatever special about what we do. Writers and readers of *Whole Earth Software Review*, all we're doing is talking — word to word and place to place. This column fills in a bit about our place.

The major news, and sorrow, this issue is about losing editor Richard Dalton. The first person hired for the *Whole Earth Software* project a year ago, he has been the wagon train leader whose savvy and inventiveness made the difference getting us across barren country to the promised land. The promised land, as usual, is lushly populated with grizzly bears to further our education. Meanwhile Dalton is heading back alone across the desert to see who else needs help. Our gratitude goes with him. We hope his seasoned voice and counsel will continue in the magazine.

Taking over is Art Kleiner, familiar to readers as the assembler of the telecommunications survey and the "Enabling Computers" material in this issue, author of "The Next Phone Company" in the first issue. Art was Research Editor on both editions of *The Next Whole Earth Catalog* and has been part-time editor of *CoEvolution* for the last few years. He has always been our resident computer enthusiast—it was Art who found Richard Dalton.

While we're on editors, this might be a good time to informally introduce the domain editors of the *Whole Earth Software Catalog*, who will be increasingly showing up here in the *Review*. LEARNING editor Robert Scarola, prominent in this

issue on p. 58, is a grade school teacher in Bolinas, California. Art Kleiner is TELECOMMUNICATING editor; I'm WRITING editor. ANALYZING (spreadsheets and such) is being edited by Woody Liswood, software reviewer on *The Source*, computer consultant and instructor. ACCOUNTING belongs to the well-named Marsha Mather-Thrift, office manager of a pharmaceuticals research firm, fiction writer and book reviewer. ORGANIZING (databases, etc.) is being organized by Tony Fanning, who does something not a conflict of interest at Hewlett-Packard, and Robbie Fanning, who edits a magazine of needle arts. Managing MANAGING is Sharon Rufener, who employs her law degree and art degree in computer systems design and consulting. Rik Jadrnicek, reviewer for *Byte* and *InfoWorld*, recently specializing in graphics, edits DRAWING. With considerable glee Steven Levy, columnist for *Popular Computing*, *Rolling Stone* writer, author of forthcoming *Hackers*, edits PLAYING. And we're honored to have as editor of PROGRAMMING Gerald M. Weinberg, the very same who wrote the classic *Psychology of Computer Programming*. Barbara Robertson coordinates their efforts; *Review* Assistant Editor Matthew McClure coordinates the book production. Coordination is too light a term.

The book they're helping edit, the *Whole Earth Software Catalog*, and the magazine you're helping edit by using it, the *Whole Earth Software Review*, are busy making each other. That may explain the otherwise alarming numbers in the financial report. This is the dip-into-capital period where the healthy advance from Doubleday for the book is fully employed building an on-going apparatus for sound and subtle judgment of software values. (Good luck.) What you see in the financial

report was planned and budgeted for. To our astonishment we're \$20,000 ahead of ourselves with income this time and \$30,000 behind on expenses, total 50K better than we projected. A few more months like that and we'll stop breathing so shallowly.

Subscribers are always supposed to be jollied along. Magazines are confidence games. We'll tell the harsh truth — doing fine so far. Maybe it'll get harsher later.

Still more good news . . . Proofreader Susan Erkel is finally making an honest man of handsome Don Ryan, mainstay of the Art Department, on April 15, and bookkeeper Andrea Sharp is well and truly pregnant with a sibling for her 3 year old daughter Sarah, who will be a tough act to follow. Since Andrea spends most of her day in front of a computer and harbors doubts about what radiates from video display terminals, she has a Soma shield in front of the screen and wears a lead apron these days.

—Stewart Brand

With no small number of regrets, I am resigning as editor of the *Review*. Midwifing a new publication is exciting and I'm gratified by the comments many of you made about our initial efforts. I'm appreciative of those who took us seriously about wanting to be interactive with our readership and have sent suggestions, comments, brickbats and encouragement. The *Review* can be a unique service for people interested in personal computing so long as that two-way communication continues.

I've met a number of excellent human beings that I'll miss. Any of you with similar feelings should know that I will be holding forth in

my home/office/cave at 168 Funston, San Francisco, CA, 94118, where I'll be writing and doing the odd bit of consulting. Drop me a line if you'd like to continue the conversation.

Thanks for your help. Time to swim out of the harbor and back out to sea.

—Richard Dalton, Editor

FINANCIAL REPORT

WHOLE EARTH SOFTWARE REVIEW & CATALOG December 1983—February 1984

INCOME

Subscriptions	\$71,574
Direct Distribution	0
National Newsstand Distrib.	30,982
British Advance	22,326
Interest	3,730

TOTAL INCOME \$128,612

EXPENSES

Salaries	\$85,006
Writer/Contributor	6,257
Production Supplies	3,940
Printing (Magazine)	58,124
Sub. Fulfillment	3,256
Sub. Promotion	35,499
Distribution	5,261
Office, Computer Supplies	7,502
Equip. Rent/Maintenance	235
Telephone	3,569
Networks	1,838
Postage	1,363
Travel/Entertain./Auto	8,300
Rent & Maint./Utilities	11,571
Legal/Professional	1,013
Misc. Other	1,020

TOTAL EXPENSE \$233,754

POINT CORPORATE 19,432

CAPITAL EXPENDITURES 9,396

NET CASH \$ - 133,970

What We Use Ourselves

R:base 4000

IBM PC, XT/compatibles (PC DOS, MS-DOS; 256K); Burroughs B20, Convergent Technologies (CTOS); N-GEN and NCR Worksvaver (BTOS). \$495 (PC DOS, MS-DOS); \$795 (BTOS, CTOS). EXTENDED REPORT WRITER (Version 1.01): \$150. Microrim, 1750 112th Ave. N.E., Bellevue, WA 98004; 206/453-6017.

Like any software magazine, the *Whole Earth Software Review* has a voracious appetite for programs. The Research Library orders, processes, receives, catalogs, disseminates and tracks all of our permanent and temporary holdings — books and hardware included.

In the beginning, the relentless inflow forced us to depend on a woefully underpowered index card file system. We launched a talent search for an in-house data management system, and our most important guideline became "don't get stuck with the wrong one."

We knew that our needs would continue to grow, so we wanted power in the sense of large data capacity, speed and flexibility: to be able to load enough information onto the database so it could work for us in many situations. We also wanted an easy-to-learn system that would not turn all of us into full-time students mastering a new language.

The Prompt option allows you to issue a command by filling in the blanks following an explanation of the command. "Rules" lets the user define error-checking conditions for data entry.

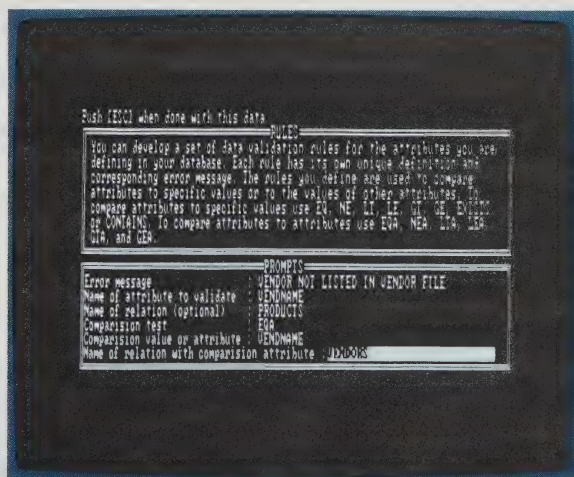
After considering the wide range of information managing programs, from file managers to true relational databases, we decided to use Microrim's *R:base 4000*.

What first attracted me, personally, to *R:base* was its pedigree. In its mainframe incarnation, *R:base* was used by NASA in the space shuttle project. There it underwent field-testing and debugging, and its basic structure was preserved in the microcomputer version. It is a smooth-running, well-thought-out program.

A quick run-through of the *R:base* tutorial satisfied us that it would work for our needs, but the true test came when we began loading and accessing data.

It took some trials and errors before the database was set up the way we wanted it and I found the nicest thing about *R:base* was its ease of modification. Everybody loves a forgiving program, and *R:base* allows one to radically modify file structure and field lengths without having to totally rebuild the database.

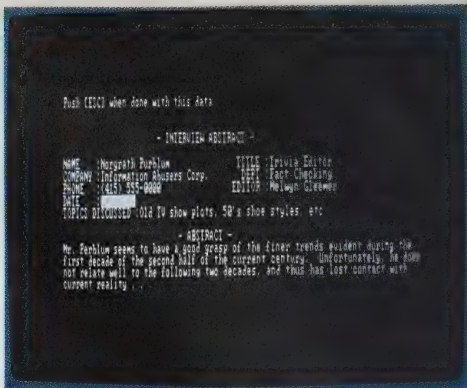
The syntax of its "English-like" command language took some getting used to (as in "SELECT ALL FROM VENDORS USING VNAME ADDR1 WHERE VSTAT EQ CA") but the option of using "prompt



screens" allows one to avoid syntax confusion during the learning stages. Microrim will also release a natural language option called CLOUT soon, which will allow the command shown above to be stated in a form such as, "Gimme all the California vendors."

It was soon after our data entry really got rolling that we ran into trouble. Trying to sort our files, we would get a "check for full disk." The disk was not actually full, but lacked the empty space necessary to complete the sort. Microrim's helpful User Support people confirmed that you can't run much of a relational database on floppy disks. If every field must be able to be related to every other field, they all need to be on the same disk.

We acquired a 10Mbyte hard disk and things have improved. *R:base* sorts fast, runs fast, and we have no immediate worries about disk space. We are about to install the Extended Report Writer, which should remedy any shortcomings in *R:base's* reporting capabilities.



Custom-designed forms provide one method of loading data into a "relation." *R:base* uses "attributes," "relations" and "rows" in place of "fields," "files" and "records." Text fields as long as 1500 characters are acceptable.

We also like *R:base's* compatibility with other popular programs such as *WordStar*, *dBase II*, *Multiplan* and *1-2-3*. Files from these programs can be read into *R:base*, and *R:base* files can be configured so they can be read by other programs. Very handy for form letters and other uses. —Clifford Figallo

```
Storing report
End R:base reports definition
R:SET WIDTH 100
R>OUTPUT PRINTER
R>PRINT UPDATE SORTED BY RECVDATE TYPEINDX WHERE RECVDATE GE 03/10/84
```

PROGRAMS RECEIVED SINCE 3/10

TITLE	VENDOR	DOMAIN	RECEIVED
Master Tax Preparer	CPAids	acco	03/12/84
Cheque Book	Batteries Included	acco	03/13/84
ACCT PAC 1	Modular Software Systems, Inc.	acco	03/13/84
DAISY Professional	Rainbow Computing, Inc.	anal	03/13/84
Photographs, Slides, Movies	Batteries Included	etc.	03/13/84
Home Inventory	Batteries Included	etc.	03/13/84
Recipes	Batteries Included	etc.	03/13/84
Stamps	Batteries Included	etc.	
Audio/Video Catalogue	Batteries Included	et	
NUTRI-CALC	PCD Systems, Inc.		
Electronic Address Book	Batteries Included		
Factory, The	Human Engineered		
M-ss-ng L-nks	Human Eng		

The commands at the top produced the columnar report. The reporter that comes standard with *R:base* is limited to this format, but the Extended Report Writer offers many more options. Output can be sorted on up to 10 attributes at the same time.

Reader Survey

On page 4, we asked for your help refining the "access" format we use. Please take a moment to answer the following questions:

Do you think the format on page 4 is adequate? _____ YES. _____ NO.

What should be changed or added? _____

Is knowing whether a program is "copy protected" important to you?

_____ YES _____ NO.

Would you like to know if a backup copy of the program is included or how to obtain one?

_____ YES _____ NO.

Were the articles in this issue useful? Yes Somewhat No

	Yes	Somewhat	No
Telecommunicating			
The New Home Computers			
Enabling Computers			
Writing Tools Update			
Learning/Playing			
Inside			
Problem Solving Equations			
Drawing			
Electronic Notebooks			
One Picture is Worth 10 ⁶ Words			
Printer Pro's Picks			
Cat Fur in the Disk Drive			
The Sales Edge			
What's Worth Reading?			
Replaced by a Computer?			
Is It Stealing?			
Point Foundation			

What subjects would you like to see us cover in future issues? _____

Any other comments? _____

Thanks for your help. We welcome letters, reviews of programs or other products you think are unusually good. Write us (Whole Earth Software Review, 150 Gate Five Road, Sausalito, CA 94965), or if you can telecommunicate, send us a message via The Source (PS0008), CompuServe (76703,436 or type GO WEC at any prompt), MCI MAIL (AKLEINER) or the EIES Network (account numbers 866, 226 or 324).

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3SR2

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A subscriber to the *Whole Earth Software Review* recently told us, "I'm interested in new programs and I also want to explore computing *within* the programs I've already purchased." From shared wisdom about using computers to product recommendations that illuminate possibilities with software and hardware, the *Review* is precisely about that — exploring computing.

The range we're covering is everything from lap computers up through business local area networks. Personal computers are blurring the distinctions between home and office (also between home and school), and we'll be serving both sides of those blurs. And the blur itself.

Other magazines are excellent resources for finding out what's new, what's being advertised, what can be bought for your particular computer, but if you'd like to supplement the ratings graphs with the kind of qualitative thought about computing and software you've read in this issue, we invite you to become a Charter Subscriber to the *Review*.

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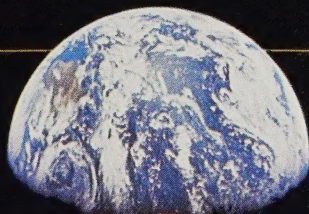
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We look forward to enrolling you as a Charter Subscriber, and hope that in addition to filling out the Reader Survey, you'll continue to view the *Review* as an interactive forum by regularly sharing your thoughts on this magazine and your personal explorations with computing.

—Thank you



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CONCON

'85



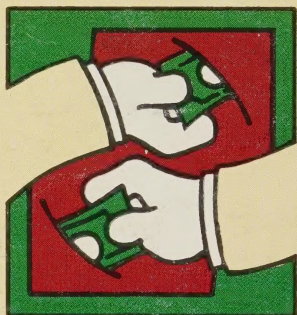
Kevin Kelly

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ConCon '85 is cosponsored by the American Association of Specious Software and *InfoMuck* magazine. It will be held April 1, 1985, on the *Queen Mary* in Long Beach harbor. A 48-hour party and trip to Ensenada, Mexico will follow for all members of the press featuring a special showing of the film *Lost Weekend*.

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